

# PACIFIC DISCOVERY

Exploration

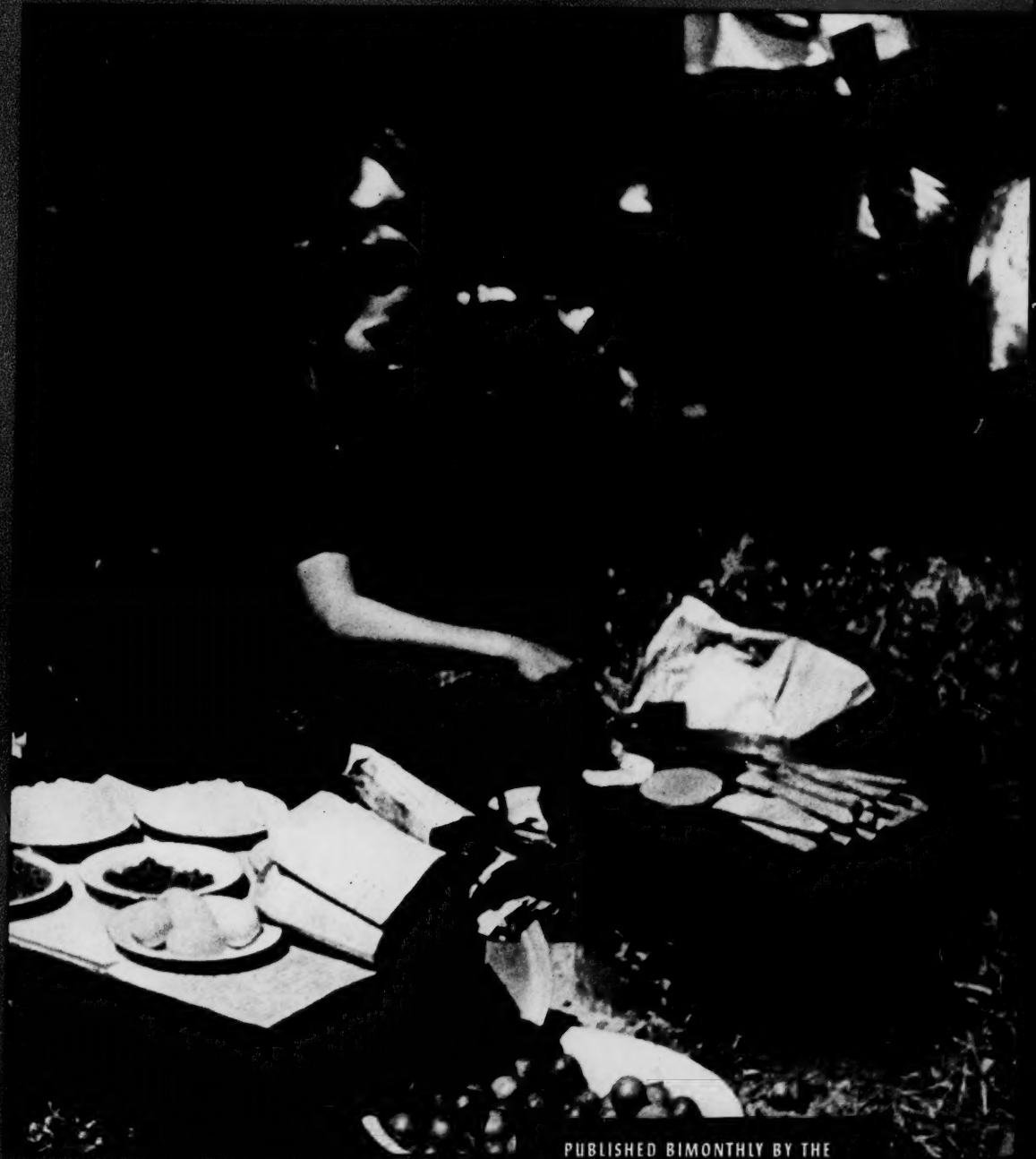
History

Geography

Nature

Art

FIFTY CENTS



*Thailand*

PUBLISHED BIMONTHLY BY THE  
CALIFORNIA ACADEMY OF SCIENCES

VOLUME XIII · NUMBER 5

Editor & Art Director: DON GREAME KELLEY; Managing Editor: ROBERT C. MILLER; Associate Editors: IRA L. WIGGINS (Stanford University), A. STARKER LEOPOLD (University of California), JOEL W. HEDGPETH (College of the Pacific), VERONICA J. SEXTON, BENJAMIN DRAPER, ROBERT T. ORR, ALLYN G. SMITH (California Academy of Sciences); Special Correspondents: THANE RINEY (Southern Rhodesia), GRAHAM TURBOTT (Canterbury Museum, Christchurch, New Zealand); Advertising and Circulation Manager: HAL RICHARDSON

IN A SPECIAL ISSUE such as this on Thailand we can serve up bits and pieces with enough flavor, we hope, to whet your appetite for more. The best "more," of course, is to go there. The next best would be fine documentary films. Lacking these (the Anna-and-the-King kind of thing is about as far from documentary as you can get), there are books. We have listed some on page 1. These have been conscientiously written by people who know their subject at first hand; we commend them to you the gentle further reader.

Our cover, a photograph by Professor Lauriston Sharp of Cornell University (whose Southeast Asia Program is conducting one of the most intensive social studies ever made in Thailand, that of Bang Chan Village which some of us visited on a field trip of the Ninth Pacific Science Congress in 1957) is not spectacular but is sympathetic and characteristic. To one who knows Thailand even slightly, it says something about Thai hospitality, and love of good food, festival fun, and outdoor living. Besides the dishes of fluffy white rice and the eggs there are some very lively curries and a wonderful variety of fruits. Most of Thailand eats well by Southeast Asian standards, and often. The Thai, like us, are great snackers and nibblers and soft-drinkers (they apparently do much less hard drinking than we do, though this is not said by way of value judgment, just by the way). Another Thai quality is evident here in the quiet grace and beauty of the young lady barbecue expert.

Thailand is not Paradise on earth nor its people paragons of pure virtue, even if some editorial emphasis on their best qualities were to be admitted here. But in a world with its Koreas and Congos and Cubas and other trouble spots, we think it is good to take time out from the daily papers now and then to read about a place where people seem content to keep on peacefully and goodnaturefully being human in one of the rather better senses of the word. We salute the Muang Thai!

PACIFIC PROFILIST **Dr. Robert C. Miller**, Director of the California Academy of Sciences, knows his subject personally, having exchanged both letters and visits with Dr. Boonsong across the Pacific for a number of years, in friendship and in pursuit of common interests — birds, wildlife conservation, science museums. . . .

¶Having taught agriculture and science in the Santa Cruz (California) High School for 27 years, **Robert E. Burton** is continuing a varied career of public service — which includes seven years on the Santa Cruz City Council — through his recent election to the Santa Cruz County Board of Supervisors, term to begin next January. He served as MSA Crop Production Specialist in Thailand in 1949, 1951–52, following a tour of post-war agricultural rehabilitation duty in the Pacific. The Burtons have raised five children in their Santa Cruz home and now boast 14 grandchildren. . . . ¶**Philip Ferry** is a San Franciscan who spends as much time as possible traveling about the world with a camera and a typewriter. . . . ¶We first heard from ornithologist **Dr. H. Elliott McClure** when he was on medical duty with the Occupation in Japan. He turned up at the Ninth Pacific Science Congress in Bangkok, and the last address we have is with the U.S. Army Medical Research Unit, Institute for Medical Research, Kuala Lumpur, Malaya. . . . ¶**Dr. Arthur C. Smith** will soon move from his Richmond, California home to the Hayward area to be near his faculty post at Alameda State College. . . . ¶**Morrison Planetarium Manager George W. Bunton** will include the King-and-Eye-on-the-solar-eclipse story in the coming Planetarium show, "A Pacific Festival of Stars," which will run 6–18 September. Ranging from the King of Siam's eclipse to ancient sun temples in Mexico, Polynesian star-navigation, and Northern Lights, this unusual show will be the Academy's part in San Francisco's annual Pacific Festival, 9–18 September.

D.G.K.

## IN THIS ISSUE

EDITORIAL	
Meeting the Muang Thai	1
PACIFIC PROFILES	
Audubon of Thailand	
ROBERT C. MILLER	2
The Rice Toilers of Thailand	
ROBERT E. BURTON	4
Ayudhya, a Page from Thailand's Past	
PHILIP FERRY	16
ROADS TO DISCOVERY	
Pingers' Progress or: Birding on a Bamboo Raft	
H. ELLIOTT MCCLURE	21
FOCUS ON NATURE: Pythons and Kingfishers	
ARTHUR C. SMITH	27
ASTRONOMY: Demons and Kings	
GEORGE W. BUNTON	28
REVIEWS	31
FROM THE READER	32
Academically Speaking	33

## THE COVER



FOOD FOR A FIESTA in Bang Chan Village, Thailand. Photograph by Lauriston Sharp, courtesy Cornell University Southeast Asia Program.

*Pacific Discovery* is published bimonthly at Gillick Printing, Inc. by the California Academy of Sciences. Publication office: 2057 Center St., Berkeley 4. Editorial, Advertising and Circulation offices (to which all correspondence should be addressed): Golden Gate Park, San Francisco 18. Annual subscriptions: U.S., \$3; Foreign, \$3.50. Single copies, 50c. Members of the Academy subscribe through their dues. Entered as second-class matter, February 17, 1948, at the Post Office, Berkeley 4, Calif., under the act of August 24, 1912.

Copyright 1960 by  
California Academy of Sciences

A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD

CIRCLING THE RICE FIELDS around Bangkok Airport a few miles outside the Thai capital, the Japan Air Lines DC-6 from Tokyo via Hong Kong, depressurized for landing, quickly became an oven. The cool green Southeast Asian checkerboard was suddenly close enough to make room on the squares for, first, big black water buffalo, then men and women. Landed and open, the plane took the tropic blast off the tarmac like a wave, while Ninth Pacific Science Congress\* delegates and other dripping passengers—all of us who were first-timers here, at least—began the semi-conscious process of soaking in first impressions of a new country and, especially, its people. The tiny figures in the paddies were symbols on the map of Southeast Asia. Now they were life-size and particularized as baggage handlers, grease monkeys, pursers, travel agents, customs and immigration officers, and all the familiar types of a modern international airport. Then in the waiting room they became a special group of the most pleasant, patient, courteously helpful persons—mostly young ladies, if I recall correctly, given to smiling frequently with great charm—who were there to greet delegates, verify our hotel reservations, and be generally useful.

And so we met the Thai, and during the next two or three weeks we got to know them—only the generalization is less than half right here. For although “the Thai” as meaning a distinct part of the whole of humanity is a perfectly valid and explicable term, Thailanders invariably separate out on acquaintance as markedly individual personalities. Thus we soon came to recognize the genial urbanity of our Congress President, Air Marshal M. M. Vejyant-Rangrisht (“Marshal Muni” was happily sufficient in addressing him). Or we felt the quiet friendliness of Dr. Boonsong (subject of our next two pages). Or we admired the goodhumored capability of Miss Somphon as she managed the cuisine of a post-session field trip (Roads to Discovery, this issue). One of my own most cherished memories—if I may be pardoned for bringing it in—is that of a brief, but on her part spirited conversation at the Royal Garden Party with Her Majesty, the very gracious and beautiful Queen Sirikit.

From King and Queen to Chulalongkorn University professor to student guide, the Thai completely captivated members of the Congress by the spirit and manner in which they took on the enormous and in many respects unfamiliar job of managing and being hosts to a convention of several hundred foreigners from all over the world. The outstanding qualities that made the Thailanders so successful in this are dignity, courtesy, humor, and flexibility. And these attributes are found on the most menial occupational level.

Who are these people who call their country Muang Thai—“Land of the Free”—and identify so completely with this concept that, despite much ethnic diversity, they call themselves Muang Thai also? The sociologist John E. de Young says: “The peasants of the north and northeast, who are half of all the peasants of the country, have long been re-

ferred to as Lao, but this is an arbitrary designation. . . . The Thai-speaking peasants of the two northern areas do not refer to themselves as Lao but as Muang Thai, as do the rest of the peasants of the country; and these so-called Lao are as Thai as the central and southern groups, all having drifted into Thailand from the Yunnan provinces of China between the first and fourteenth centuries A.D., bringing with them a tropical wet-rice paddy culture adapted to the lowlands.”

With the “get up and git” of a vigorous people, they poured over the ranges and down the rivers out of southwestern China, to find more room, better land and living, to shake off Mongol pressure—for whatever reasons, much as our people swarmed over the Appalachians, they moved. Advancing continuously west then southward, always excellent adapters and absorbers of other cultures, they became more and more the Muang Thai, a people with an identity and a drive. Entering the Menam basin, they found themselves between two other upswinging cultures, the Burmese to the west and the Khmer—Cambodian—to the east. The three have slugged it out, down the centuries to the present. In all Indochina, the Thai alone have never become the colonial wards of an outside power. They remain Muang Thai.

The group identity of this forward-looking people has never been that of a collective mass, a herd. It has always been expressed through the self-aware but group-minded purposefulness of individuals, if we read correctly the character illumined in their history; and this is certainly one reason why we of the West have found them so congenial. And—this is perhaps the principal ingredient of our happy relationship—they have not suffered the indignity, and we the shame, of the kind of inequality the West has so often thrust upon the East. D.G.K.

THESE BOOKS are strongly recommended for your further reading about Thailand and its people. Since the story of the Thai is so closely interwoven with that of neighboring peoples, *A Short History of Cambodia* is not out of place here. The Thai and the Khmer have been swapping cultures and kings for centuries. These are the best current titles we can find:

**Thailand: Its People, Its Society, Its Culture.** By Wendell Blanchard, in collaboration with Henry C. Ahalt, Aldon D. Bell, Mary E. Gresham, Bernard G. Hoffman, Jean H. McEwen, John H. Scharr. Country Survey Series. Human Relations Area Files, Inc., Box 2054 Yale Station, New Haven, Conn. 1957. x + 528 pp., maps, diagrams. (Paper) \$6.50.

**Thailand: An Introduction to Modern Siam.** By Noel F. Busch. The Asia Library. D. Van Nostrand Company, Inc., Princeton, New Jersey. 1959. ix + 166 pp., map, line cuts. \$3.50.

**Village Life in Modern Thailand.** By John E. de Young. Institute of East Asiatic Studies. University of California Press, Berkeley and Los Angeles. 1958. xi + 225 pp., 6 maps and plans, 15 photos. \$4.50.

**A Short History of Cambodia: From the Days of Angkor to the Present.** By Martin F. Herz. Frederick A. Praeger, Publishers, New York. 1958. 141 pp., map. \$3.00.

\* Held in Bangkok 18 November-9 December 1957.

# Audubon of Thailand

Boonsong Lekagul, M.D., Thailand's distinguished physician, naturalist, and conservationist, shows the author, the editor of *PD*, and other members of the Ninth Pacific Science Congress some specimens in his famous scientific collection of Thailand birds. (D.G.K.)



THAILAND—meaning “land of the free”—is a land of beauty and of bounty. Larger than Spain, intermediate in size between California and Texas, it is blessed with scenic mountains, lush tropical forests, rich agricultural lowlands, and—above all—with a population of energetic, intelligent, and friendly people. In a continent traditionally characterized by a tragic race between population and food supply, Thailand—with a population density of about 91 persons per square mile, one of the lowest in Asia—is abundantly able to feed her own 23,000,000 people and to provide rice for export to her neighbors.

This prosperous and happy land has until recently enjoyed an abundance of wildlife, including the elephant, tiger, rhinoceros, water buffalo, those curious wild cattle the banting and the gaur, and a rich and colorful avifauna. For generations man and wildlife existed side by side with little impact upon each other. But the Thai are a progressive people, willing to learn from the West. And what they have learned is what we have learned a trifle late—that wildlife cannot

compete with modern firearms and a changing environment. Thailand is of necessity becoming conservation-minded.

The most important single agent in this change of outlook is a Bangkok physician, Dr. Boonsong Lekagul—known affectionately to his friends both at home and abroad as “Dr. Boonsong.” The Thai people are great on first names—they can out-do any American service club. As one Thai official explained to me, “Our family names are too long and too hard to pronounce. So we use first names.” Though Lekagul is an easier family name than most, in accordance with Thai custom the subject of our Profile is most widely known by his given name.

Dr. Boonsong was not always a conservationist. He began as a big game hunter in the traditional sense, shooting large game animals with a high-powered rifle. Then he became interested in birds, and began collecting them and studying them in a serious scientific way. As he built up the largest scientific collection of birds of Thailand in existence, he became increas-



ingly aware of the interest and importance of birds as living organisms. He became less and less the hunter and more and more the student of bird behavior. Also he became increasingly aware of the disappearance both of big game animals and of birds from the Thailand scene, and he became alarmed. Now the erstwhile hunter exerts his efforts to protect the hunted.

Dr. Boonsong is today not only the leading naturalist but also the leading conservationist of Thailand. He now shoots with a camera instead of a gun. He has taken some of the finest motion pictures of a vanishing fauna that have ever been made, and he has used them effectively and eloquently in a superb effort to preserve some of the wildlife values of which he has become aware.

He addresses his efforts especially toward children, feeling that they are the hope of the future; and he has written several books especially for them.

He is a man of extraordinary energy. A Doctor of Medicine (from Chulalongkorn University) with a large practice, he operates his own clinic eight hours a day. He arises at five o'clock in the morning, spends two or three hours at natural history, then goes to his clinic. At four or five in the afternoon he returns home, and from then until midnight he is again a naturalist. A close friend has said, "I have never seen him tired."

In his physical presence Dr. Boonsong, like many of the Thai people, appears deceptively slight of build. He is in fact an athlete and a man of great physical endurance. He is an excellent and somewhat daring swimmer, and is thoroughly at home in a wide variety of outdoor activities.

In personality he is quiet, affable, easy to converse with, generally serious but with frequent flashes of humor. He always gives the impression of being unhurried and relaxed, even under conditions of considerable strain. I was once riding with him in his automobile when we ran out of gas—a fair test, I think, of any man's disposition. The day was hot, and we were in a hurry to get to an appointment. Dr. Boonsong, completely unruffled, hailed a passing taxi, rode with me to the nearest service station, then sent me on in the taxi while he got a can of gas and went back to his car. We arrived at our common destination only a few minutes apart.

Dr. Boonsong does a great deal of public speaking, and presents a weekly television program in Bangkok on natural history and conservation. He also speaks over the radio twice a week, and writes weekly articles for two or three newspapers. Whether speaking to a group of villagers in a rural area, or giving a formal lecture, or speaking over the air, his manner is relaxed and his tone conversational. It seems to make no difference to him whether he is speaking to one person, or a hundred—or thousands.

I am indebted to David Davies of the faculty of Chulalongkorn University for the following charming picture of Dr. Boonsong addressing a rural audience: "It will be announced that he is going to speak in a village. The meeting house which is very large will prove too small so he will have to speak in the open

air. Thousands of people will arrive and they find him so fascinating that not a baby whimpers, and besides his voice only the night birds and the crickets can be heard."

It was Mr. Davies who suggested the title for this article, "Audubon of Thailand," because Dr. Boonsong not only knows so much about birds, but also draws them beautifully and accurately.

Dr. Boonsong is secretary of the Association for the Conservation of Wildlife in Thailand, and served as organizing chairman of the Museums Section of the Ninth Pacific Science Congress, held in Bangkok in 1957. He has two paramount objectives, in addition to his general program of public education in natural history and the conservation of natural resources. He wishes to see a system of National Parks established in Thailand, comparable to the National Park System in America. This seems very close to realization, the King and Queen and various public officials lending their interest and support. He also wishes to see a National Museum of Science established in Thailand, which will carry on the work he has begun, and of which his own important collections and large scientific library can become a part. This too we trust is well on the way to accomplishment—a fitting climax to his long, unselfish effort.

ROBERT C. MILLER



Reproduction of a color plate by Dr. Boonsong as printed in one of his many nature books.



## The Rice Toilers of Thailand

*IN many a home in Thailand there is a statue of Buddha—not the image of an individual but the symbol of a pure life given to inward contemplation and the practice of a set of virtues strikingly similar to those of our Decalogue. This image of Buddha rests upon five superimposed platforms, each one representing a virtue. In front of the statue, on the first platform, there is a bowl of uncooked rice. Buddha, as he looks forward and downward, apparently gazes at that bowl of rice, and meditates. Meditates on what? Probably on the value of rice to his people. . . .*

**T**HE RAISING OF RICE IN THAILAND is not merely an occupation—it is a cult. It may seem more like a hardy task to the men and women (mostly

women) who work in the flooded fields of Thailand from early dawn to late sunset hours, in heat and wet, but a sort of cult it is.

The culture of rice in Thailand's flood-plain regions—especially the lower Menam Valley basin—is so ancient and universal an occupation that it is ingrained in the nature of the people. It has been, increasingly, their very life. A failure of the rice crop meant death to many persons; two consecutive failures might seriously weaken the State; three might bring its collapse. There are no substitutes for rice in Thailand. It is no wonder that the folklore of rice growing is rooted in ritual and ceremony, that the rice farmer has status in his society.

Who gave rice to the world? Whence did it come?

4

▲ "Look at me! Three score years or more have I toiled in the rice fields left to my care by my forefathers at Phuket in Thailand. Would you say I was abused? underprivileged? in need of reform? unhappy? restless? I am not afraid of tomorrow. I know that my children know how to grow rice, and Mae Posop will smile on us. . . ."

## ROBERT E. BURTON

### Facts, figures, and futures

IN NO OTHER COUNTRY IN THE WORLD, probably, does a single industry occupy as great a proportion of its inhabitants as rice farming does in Thailand. Here 88.5 per cent are farmers and it is safe to assume that at least 85 per cent are rice farmers out of a population of around 23 million people.\* (In the United States 20 per cent of the people are farmers.)

But the most significant fact, in this present world shortage of food, is that Thailand is one of the few countries which not only feeds its own people but exports a surplus—about 1.5 million tons of rice a year, vital to the life and stability of Southeast Asia, go out from the Gulf of Siam.

Before World War II (in 1937–38) Burma produced 6,998,000 metric tons of paddy rice (in the hull); Indo-China, 6,308,000 metric tons; and Thailand, 4,591,000 metric tons. After the war (in 1949–50) Thailand had risen to first place with 6,684,000 metric tons; suffering internal unrest, Burma had fallen to 5,171,000 metric tons, Indo-China to 5,511,000. In the 1936–40 period the average exportable surplus of rice in the world was 9 million metric tons—3 million from Burma, 1.3 million from Thailand, with the U.S. in tenth place at 107,000 tons. In 1952, be-

\* 20,686,000 according to a U.N. estimate of 1956. Thailand's population is increasing rapidly.

sides feeding its own people, Thailand was the world's chief rice exporter, furnishing more than one-fourth of the rice going to hungry importing nations. This makes Thailand a strategic nation in world politics, especially in Asia. And yet Thailand (200,148 square miles) is only a little larger than California (158,693 square miles), and smaller than Texas (267,339 square miles), or Burma (261,789 square miles).

These are the statistics of rice growing in Thailand, and yet, to anyone who has lived in this land and learned to know its people, it is not the size of the industry nor its commercial importance which make an appeal, but the orderly rhythm of its rural life—the matter-of-fact way this ancient task is performed and the numerous customs and ceremonies which, throughout the ages, have interwoven themselves between the people and the soil, the rice plant, the weather, and water.

How will Thailand's rice culture survive the impact of modernization? So far, modern agriculture has had but little influence upon it—partly because of ingrained customs which are hard to displace; partly because of local conditions of soil-land ownership, weather, seasonal water flows; but most importantly because the capital necessary for large-scale operations of mechanized agriculture is not available in Thailand. It is probable, moreover, that the mechanization of rice growing in Thailand would bring about troublesome social disturbances far outweighing the material advantages it might give to a few.

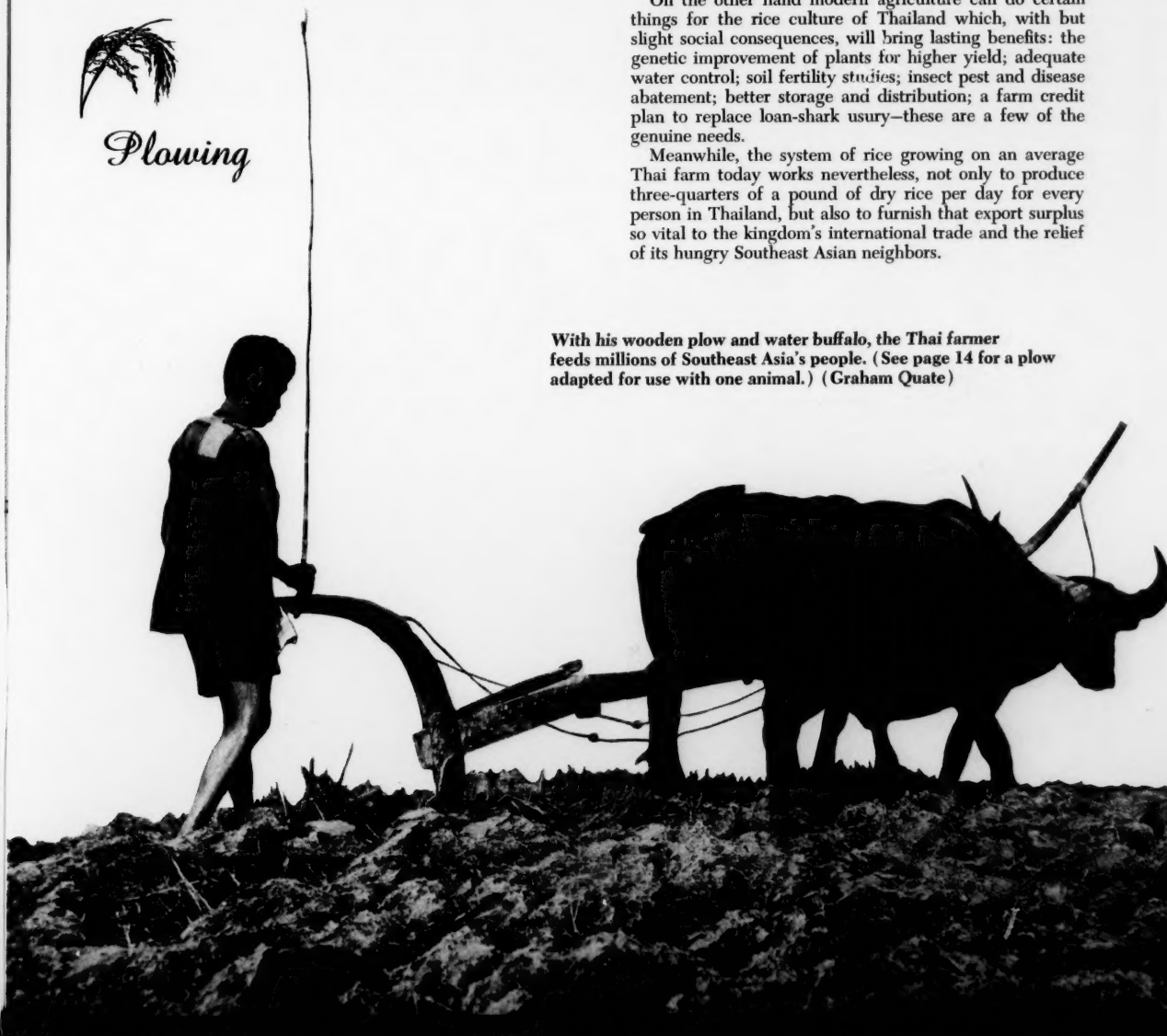
On the other hand modern agriculture can do certain things for the rice culture of Thailand which, with but slight social consequences, will bring lasting benefits: the genetic improvement of plants for higher yield; adequate water control; soil fertility studies; insect pest and disease abatement; better storage and distribution; a farm credit plan to replace loan-shark usury—these are a few of the genuine needs.

Meanwhile, the system of rice growing on an average Thai farm today works nevertheless, not only to produce three-quarters of a pound of dry rice per day for every person in Thailand, but also to furnish that export surplus so vital to the kingdom's international trade and the relief of its hungry Southeast Asian neighbors.



### Plowing

With his wooden plow and water buffalo, the Thai farmer feeds millions of Southeast Asia's people. (See page 14 for a plow adapted for use with one animal.) (Graham Quate)



The only answer yet possible, botanists generally agree, is that Asia is the original home of rice. Indeed, many believe that cultivated rice may have had its start on, or close to, the plains of Thailand. Wild members of the rice tribe are found in Thailand, in Minnesota, and on the mesas of our Southwest. But there is a difference between our wild relatives of rice and the cultivated *Oryza sativa* of Asia. The former have always remained free of man, seeding themselves; the latter has been planted and nurtured by man for so long that, deprived of his care, it will fail to reseed and maintain itself. Where abandoned—on islands, for instance—it has been known to disappear completely in a very few years. Rice and men need each other.

From May to December someone is always plowing and planting rice somewhere in Thailand, beginning in the northern provinces around Chiangmai, ending near Hatyai in the south—a nine-hundred-mile reach—following the monsoons. Culture is somewhat dependent on the kind of rice.

There are hundreds of varieties of common rice, varying in shape, shade, color, and taste. They fall into five main groups: first, the wild rice, a botanical curiosity; second, the common rice of the plains, raised mostly by irrigation; third, the upland rice, grown on moist hillsides without irrigation; fourth, deep water rice, which grows in deep flood plains and reaches heights of five to seven feet as it struggles to escape



The dragon-bone pump: a series of rectangular paddles attached to a continuous chain that dips them into a stream and drags them upward through a U-shaped trough emptying into a higher-level ditch. Human power runs this pump, transmitted through a wheel which a man continually climbs, like a squirrel in a cage. Modern engineers have scoffed but, testing, have found them remarkably efficient. (Author)







From India to the Philippines, from Java to Japan, the rhythm of rice planting is the rhythm of life. (ABOVE) common plains rice (Graham Quate); (RIGHT) full-grown deep water rice. (Author)



## Planting



The wet plowed earth is broken finer by a wooden harrow and churned with water to a pudding-like consistency before planting. (ABOVE: photo by Lauriston Sharp)

drowning in rising waters; and fifth, glutinous rice, a delectable delicacy—one tires of this and it is therefore seldom an article of steady diet except among the northern tribes of Thailand. It is the second group, with its many subvarieties, which the Thai mostly raise.

The first step in its culture is the preparation of the land. In Thailand this has been divided and subdivided into innumerable flat and level basins, each one usually about the size of a city lot or less. A basin is surrounded by a 12- to 18-inch dirt levee. Into the building of these levees has gone an incalculable amount of labor, the work of ages. Much of this rice land is, naturally, on the flat lowlands of the Chao Phraya (formerly Menam) River. These are flooded periodically; but even so they must be watered arti-

The maker of spirit-house shrines, and (BELOW) the shrine in place in the back yard, with offerings and incense stick. (Author)



ficially by crude but effective, manpowered "dragon-bone" pumps. The water comes from canals which crisscross the land in every direction and divide it into large blocks with each owner having canal frontage. Built by common labor, the canals are access channels to the outside world; much of Thailand's traffic moves on them in preference to roads.

Once the land is flooded it is ready for plowing, which is done under water. Until quite recently, in Thailand, the King himself proclaimed the day to begin plowing, usually in the first part of May when the rains had come to stay for their season. Anciently, knowledge of the right time came from the Thai goddess of rice, Mae Posop; the King was present when the first furrow was turned, and his blessing gave good germinative and reproductive powers to the first seeds scattered, while priests prayed for the success of the crop. But this tradition, rooted in the mythology of the Thai's ancestors, has yielded to modern expediency.

Wooden plows drawn by water buffaloes churn soil and water into a sort of pudding. It is hard for a Western farmer to conceive of plowing heavy soil knee-deep in mud, but this the Thai farmer and his wife do, quite successfully as modern science concedes, provided the soil is wet enough.

It is interesting to note that attempts to displace Thailand's light plows of Mai-non wood (now often steel-pointed) with modern steel plows have not succeeded. In Thailand a plow must be light enough for a man to carry on his shoulders to the field where it is hitched to the water buffalo. Dragging a steel plow across centuries-old levees would severely damage





## Harvest

Harvests and hats. . .



them; steel plows often do not scour (work without sticking to the soil) as well as wooden plows under these conditions; they are too heavy for women, who do some of the plowing, to handle—these are irrefutable reasons for keeping the wooden plow.

Similarly, there has been little success with tractors, except on the few large landholdings. To deliver a tractor and its equipment to a field situated in the midst of many other fields, each surrounded by levees; to cross numerous canals, each requiring a bridge high enough to allow free navigation—this is the first problem. The clincher is the average size of the fields: a tractor cannot operate efficiently, if at all, on one-tenth of an acre.

After the land is plowed, and while still pudding-like, it is dragged with a small log having wooden teeth and pulled by water buffalo. Now it is ready to receive either seeds or transplants.

There are two ways of seeding rice: broadcasting the seed over the water by hand or machine; or hand-planting the seed much more thickly in smaller beds, near the house, and transplanting the seedlings. Another, more intensive way of preparing a seed bed for transplanting stock is to drive over the flooded beds herds of buffaloes whose hooves macerate the soil with

weeds and straw into a thick pudding. Or the animals may be corralled there overnight to mix their dung with the soil. These fields are then allowed to settle, clear water is run onto them, and the seed is broadcast over the mixture and carefully watered.

In northern Thailand where the best rice is raised the transplanting method is by far the most commonly used. It is much more economical of seed, and it gives higher yields. It takes more labor; but manpower is plentiful, cash and good rice land limited. From here on our tale of rice culture will be based on the transplanting way.

In about a month or six weeks' time the seeds in the seed bed are plants some 12 inches above the water, ready to transplant. The fields are flooded to receive them. From early morning until dusk, now, with scarcely a midday break, women bend over and plant each seedling by dexterously using the thumb, pressing the roots into the mud. They work in groups. Men are rarely seen at this task. Tradition has it that a woman's touch lends fertility to the plant; contrarily, a man's hand would lead to poor crops and famine. (Thai men respond apathetically to the suggestion that scientific experiments be used to test the theory; the women, on the other hand—to judge from their laugh-

... The parasol hat keeps off the South Thailand sun; the graceful lampshade model is popular and familiar to sightseers in the central plains area around Bangkok. (Author's photos)

ter and their splendid physiques, have made the best of it, to the welfare of the country.)

Once transplanted, the rice needs continuous attention—irrigation, weeding, dike-tending. These are days of anxiety. Heavy rains or winds can lodge the rice; floods drown it; drought scorches it; insects mine its

stems; diseases strike at its roots; buffaloes and birds threaten it—there are all sorts of ingenious devices to frighten the birds away.

While the young rice plants bask in the sun, bathed in a moist atmosphere with their feet in water, some remarkable things take place. The chlorophyll of the



## Threshing

The all-purpose water buffalo is an efficient threshing machine.  
(RIGHT: Lauriston Sharp, Cornell University; BELOW: G. Quate)







Clean paddy rice in the hull.

leaves causes carbon dioxide from the air to combine with the water on and in the soil to form starch. The germ and the bran of the seed and the stems and foliage contain minerals which come from the soil; but it can be said that most of the weight of rice comes from the air and from water. The soil furnishes only about three per cent of the weight of a rice kernel. This is why rice has been cultivated for so long on the plains of Thailand without special fertilizing of the soil.

Three main elements besides those found in starch are needed to form the kernel: nitrogen, phosphorus, and potassium. Also needed are minor amounts of calcium, iron, boron, zinc, copper, and other elements which, like our vitamins, play a part in the welfare of the plant in proportion to their quantity.

In some parts of Thailand termites contribute to the fertility of the soil. There a skyline view of a rice field shows numerous five- to ten-foot mounds of soil, like pyramids. Open these mounds and you find them teeming with termites living on what nobody knows because they do not seem to injure the rice. Instead, their mounds are rich in a fertilizer which is spread over the land. Lest the termites become discouraged, only part of a mound is used each year. The strangest thing is that in these mounds the termites store little pellets of limestone—gathered no one knows where in certain regions—which are good for the rice. Another unusual fertilizer is bat guano gathered in certain caves.

Like such other granaries of the world as Egypt, Thailand owes the long continuance of its soil fertility

to a river, the Chao Phraya. Since the remote past this river has drained one of the southern bastions of the Himalayan range into what is now called the Gulf of Siam. Formerly, this gulf extended farther north. Certain inland cities were at the dawn of human history settlements on the sea shore.



Winnowing the rice by tossing into the wind. (Author's photos)

Every year in August, September, and October the Chao Phraya reaches flood stage, depositing a certain amount of silt as it spreads over the plains. Although destroying levees and choking navigation channels, these floods yield the small annual increment of silt which keeps the soil productive. There is now talk of levees, dams, tempting hydroelectric projects—these things have their appeal. But if silts were to settle unproductively behind dams, the loss to the fertility of the land would have to be made up by the addition of costly fertilizers.

Planting rice successfully is not easy. It has idiosyncrasies all its own. Since it is a water-loving plant and grows in mud, you might think its seed would do well in mud. Not at all. Bury it even a fraction of an inch in mud and it dies for lack of air. It must rest on top of the mud, while above it plays gently a layer of water not over six inches deep—live (circulating) and well aerated water.

A kernel of rice well planted will sprout, grow into a plant about four feet high and several hundred times a kernel-weight in foliage, which will produce at least 250 new kernels—all in six months. Since on that basis Thailand produces 6.5 million tons of rice in that six months, it is easy to figure that whoever adds one kernel to the average rice plant by breeding and selection will give Thailand another 25,000 tons of rice.

There lies probably the greatest possible blessing which modern scientific agriculture can bestow upon Thailand. (A kernel of rice with its hull is about 75 per cent edible—bran included—and 25 per cent hull. Thailand produces 1,000 to 1,100 pounds per acre.)

To return to our rice plants, which by now have gained their full stature of four to five feet: a day comes when the lower portions of the stems are starting to turn yellow. Then begins the wedding season of the rice. Usually at dawn only, three inconspicuous stamens and a feathery, silvery stigma protrude from the glumes. The anthers of the stamens throw out their pollen and the stigma receives it; sometimes the wind brings pollen from another bloom. On this silent wedding, taking place at an unheralded time, depends the very life of Southeast Asia.

The fertilized ovaries grow henceforth at an amazing rate, first filling with a milky fluid, then a paste, and then becoming the hardened seed covered with its two siliceous glumes. At that stage rice is known as paddy (Malay, *padi*).

Then one day—usually it begins in the North in September—there comes over Thailand a *clip-clip* sound, inaudible at any one spot but in imagination it swells to a hum. There are other hums in the world like it: an approaching hailstorm, a factory heard from a distance, a beehive during full daylight hours. It is the sound of a force, of labor.

Thousands upon thousands of women sally forth from the villages to the fields, there patiently and carefully to cut and gather the heads of rice into bundles. Sometimes they cut them one at a time, or small sickles may be used to cut several at a time. But it is always done with care and reverence embodied in the sen-

tence, "O Lord, we thank thee for our daily bread." Characteristic of the Thai is the orderly way in which they perform certain tasks. The rice is never thrown aimlessly into a basket but is carefully tied into bundles and laid with the heads all one way.

The baskets of paddy are carried off the fields on poles, or upon sledges drawn by water buffaloes. Little is wasted, even if the plants have been lodged by wind or rain. The buffaloes are turned back upon the fields to glean what may be left, but we suspect they get very little. They live a marginal existence—on the edges of the fields. They usually look fat and contented, however, so we needn't waste much sympathy on them. They get a share of the straw. (It is impossible to separate the water buffalo from rice culture or the folklore of Thailand; he is the universal "work-horse" of the Thai farmer.)

There are various ways of threshing rice. Certain provinces have their own methods, some of which are quite ingenious. In general, the rice heads must first be thoroughly dried—not an easy task in a land of fairly constant rainfall. The heads, tied into bundles, are spread on trays, walks, railroad embankments, or trestles, where they are exposed to the sun and turned from time to time. The dried heads may be threshed in the field by dashing them into large baskets, or they may be spread out on hard ground and buffaloes driven over them, sometimes with a rolling stone or log behind them.

The threshed grain is then winnowed in the old traditional way by throwing it up into the wind. Threshing machines and winnowing fans have found their way into Thailand, especially where coöperatives exist.

Rice which is reserved for home use is often piled



Boatload of rice ready for the river trip to the mills and ships of Bangkok. (Author)



Rice moves from the farm to the market town in big two-wheeled carts pulled by water buffalo or, in North Thailand (LEFT), by a pair of oxen. (Graham Quate)



## Transport

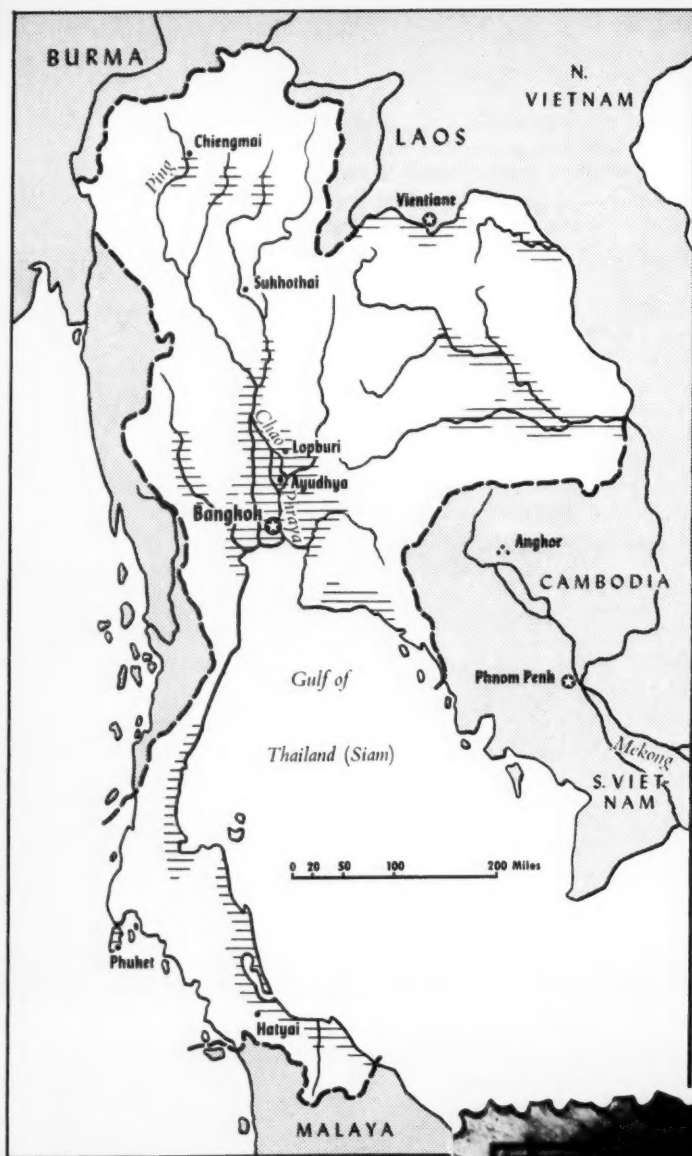


with the heads arranged in neat stacks, grain on the inside, and kept until needed, sometimes under the houses but exposed to circulating air currents. In the Northern provinces very neat storehouses are made of mud and wattle covered with good roofs and raised on eight-foot piles to give protection from rodents and chickens. The rice is threshed and hulled as needed.

Thai rice is served in the home in that fluffy, granular state, cooked all the way through, so difficult for us to obtain. No meal is complete without it in Thailand, and one of the best ways you can judge whether you have been taken into their inner circle is by their ceasing to serve you American-style food out of courtesy and letting you help yourself (three times a day) from the rice urn, with its big spoon, as it is passed around the table. Rice is called *kaw* in the Thai language and its sound a good deal like *kai* which means eggs—the difference is in the inflection of the voice, unfortunately, at first, for the stranger who may be served eggs (often of doubtful age in Thailand) and see the fluffy rice pass him by. It is singular that rice

is almost never served in Thailand except as plain boiled rice—not even salt is added—in the homes of either the rich or the poor. It might be that the Thai revere rice so much that only water may come in contact with it until it reaches your plate. Once it does, the lid is off for an array of side dishes and condiments that will baffle you. Among the curries and peppers and such may be found the vitamins necessary to compensate what plain white rice lacks. In flavors and “hotness” Thai food tends toward the Burmese and Indian rather than the blander Cantonese and Japanese.

The six to ten acres of “paddy land” of the average, long-settled Thai farm with its simple pole-framed, reed-walled and thatched house affords much to supplement the staple rice. About the farm are usually found—at least in the older communities—a wide variety of fruit trees ranging from the aristocratic durian (whose ripe effluvium along Southeast Asian roadsides no Western traveler can ever forget) to the banana which grows everywhere and is taken for granted.



**RICE LANDS OF THAILAND** shown on this sketch map by horizontal lines. The rice area around Bangkok almost equals the normal flood zone of the Menam (River) Chao Phraya. Rice areas near Chiangmai are separated by mountain ridges. An arid plateau, partly mountainous, lies between the Eastern and the Central and Northern river areas. (Data, except for Phuket which is not a primary rice area, from Joseph E. Spencer: *Asia East by South*, John Wiley & Sons, Inc., New York, 1954; see Chap. 17, "The Evolution of Thailand"—an excellent, succinct account of nation and people)

Current Thailand stamp of 50-stang denomination.

Vegetables are sometimes cultivated but more often they are gratuitous gifts of nature gathered from the canals, the forest, the hedges, the dooryards. They add up to many kinds, one of which is a sort of sweet potato (*Ipomea*) growing in the canals with its vines floating in the water. Their tips produce a green vegetable that is when cooked so much like our best spinach it is hard to distinguish the two.

Then there are the barnyard animals: pigs, chickens, buffaloes, and—most important—ducks. They get a ration of rice bran but unquestionably forage most of their food.

There is no more steady source of food on these farms than the fish in the canals. The variety of nets, traps, baskets, lines, etc., devised to catch them is amazing. When all else fails, a canal section is dammed off, the water emptied, and the fish scooped up. A few fish escape even this by burying themselves in the mud, to revive when the water returns. Certain fish can live in hardened mud through a dry season; and this is why at such times farmers are seen digging fish out of the dried ground. Besides these fish found at the doorstep there is also, of course, the supply brought from the ocean and the rivers.

Rice, being not only the family staple but the cash income crop, must be got to market. The procedure varies from one region to another but, usually, there is involved in the transaction a Chinese middleman who is both rice broker and moneylender. Let us take a look into the northern province of Chiangmai (or Chiang Mai) at rice marketing time. From January to June on the roads leading to the city of Chiangmai, convoys of ten to twenty two-wheeled carts of a striking design, each behind a pair of small oxen, rumble in to the godowns, or warehouses which are mostly





Chinese owned. There the grain is sold directly in a peculiar fashion. Each cart is supposed to hold 30 *tang* (about 20 pounds) of rice, or a little over 600 pounds—but the rice is not weighed. The Chinese merchant looks casually over the convoy and finally picks out one cart. If it is agreeable to all concerned, the rice in that cart is carefully measured and becomes the sample for all other carts in that convoy. The quality of the grain in one cart—its dryness, cleanness, etc.—becomes the standard for all: it is a sort of gamble for farmers and merchant alike.

The grain is then dumped in large piles on which chickens are allowed to run. On expressing amazement, I was told that there is so much rice the chickens don't eat it but prefer the scarcer weeds and insects.

From these places like Chiengmai at the head of river navigation, the rice is floated down to Bangkok in large boats that, like the wagons, move in convoys. There is nothing more picturesque in Bangkok than the procession of these rice convoys on their way to the large ocean-going ships and the markets of Asia. At the capital the major concentration of rice takes place, and here, too, are mills where the grain is cleaned and polished.


The government of Thailand exercises strict control over the export of rice. Not only does it see to the fumigation and standardization of the product before shipping, but it also levies an important flexible export tax. This is designed to serve equalization as well as revenue purposes, protecting the Thai people against fluctuations of the foreign market and consequent shifts of the cost-of-living base at home. Not everyone agrees that this is the fairest possible way of taxing the people—indirectly through the large-scale handling of the national cash crop. But in effect the Thai farmer pays practically no direct taxes. All his schools, his public offices, irrigation developments, roads and railroads, his medical care and sanitation (what there is of it), and the national defense, are taken care of by his government.

If this is indeed a form of state socialism, it can be argued that it works to keep the generally well fed and contented Thai people from looking with any favor toward communism as a better way of life.

The Thai people are in their greater part a society of rice farmers. These farmers have been the despair of many economists and sociologists. Because of their kindness, hospitality, and courtesy in answering questions, they have been a fertile field for these technicians. They are probably the best "surveyed" of any people in Asia. And yet, to one who has studied them carefully, there remains after all an inscrutable smile on their faces, something like the one found on many of their Buddhas, a smile which has never been fathomed.

It would be hard to convince an economist this



could be the smile of men who accept their lot with equanimity. Economists have imposing curves labeled "per capita income" which placed the Thai farmer in the \$36–38 per year bracket in 1949—near the world's lowest. Sociologists can argue convincingly that a man cannot live decently on such an income, let alone raise a family. Yet there are the Thai, their population rapidly increasing. The trouble is that we too often fail to include, in our analysis of a man's income, such things as the vegetables in the canal, the fruit trees in the barnyard, the fish in the dried mud, and the many intangibles that go to make up the total sum of a way of life, not the least of which are age-old social customs and traditions, besides a built-in human capacity for "making do" with things as they are and always have been and—so far as one can foresee from behind a wooden plow and a water buffalo—always will be. Ask Mae Posop. She has done rather well, in Thailand at least, by those who toil in her name. 

▲ *Oryza sativa*, plant (reduced), and spikelet (much enlarged).  
(From *Manual of the Grasses of the United States*, by A. S. Hitchcock.  
Misc. Pub. 200, U.S. Department of Agriculture, Washington, 1935)

# Ayudhya, a Page from Thailand's Past

PHILIP FERRY

**B**ANGKOK is one of the most exciting names in any traveler's lexicon. It is the capital city of Thailand, or Siam, as the name appears in pre-World War II geography books. Its ornate temples, Buddhist shrines, jeweled towers, and unique Jade Buddha endear it to travelers in search of the exotic. But Bangkok is not an ancient city. It has been the country's capital only since 1782, less than two centuries, a brief span indeed as time goes in the ageless Orient. Only a few miles outside the city lie the remains of the former capital, one antedating Bangkok by centuries. Ayudhya,\* as the site is named, was the age-old capital of Siam. It was sacked repeatedly during 400 years, and finally burned and deserted. Today it is a sort of museum piece of Thailand's past, weathering away in the Menam plain.

The deserted city was first brought to my attention by a young British airman I met in Hong Kong. Philip Pring had been with the British forces in Thailand during World War II and had visited Ayudhya on every possible occasion. It was, he assured me enthusiastically, an interesting archeological site, easy to reach but little known hence little visited. "People have not heard about it," was his explanation. "Those who do visit the site will view all that remains of what was for centuries Siam's most important city."

Happily, in 1957, the Thai government recognized that in Ayudhya (a-you'-tee-ah) it had a site of unusual historic interest and is now restoring it and encouraging travelers to go there. The ghost city, a rather small ruin area adjoining the living city of the same name, which can be covered in a couple of hours in a pedicab, is located 70 miles from Bangkok and can be visited in an easy one-day round trip. The trip can be made by taxi (at a price pre-arranged with the driver, about \$15.00), or by train, if one has the time. A more picturesque way than either of the above is to charter a motor launch on the Chao Phraya River, visiting the *klongs*, (canals) and the picturesque floating markets en route, observing the teeming river life of an Oriental people.

A review of Ayudhya's rise and fall will help the reader to a better understanding of the events which

\* Various spelled Ayuthia, Ayutthaya, etc.



led to the city's downfall. The Thai seem to have had their origin in the Yangtze Valley of China where they had founded the empire of Nan-Chao. Over the centuries they were crowded down into the plains of the Menam Chao Phraya in what was to become Siam. Their first capital, Sukhothai, a city-state, was founded in the thirteenth century. A century later, about A.D. 1350, a new ruler, King U-thong, began construction of a more grandiose capital city at Ayudhya on the Menam. Ayudhya became a show-place of Oriental sovereignty. It had ornate palaces, soaring temples, towers, and a great sixty-foot gold and black Buddha. The city spread out over an area of several miles and had floating gardens, palaces, pleasure domes, and a system of irrigation canals. It remained the capital of Siam for four centuries. Continuing warfare with Burma, however, with alternating victories and defeats, progressively weakened the kingdom and in 1767 Ayudhya fell before the Burmese army and was pillaged and burned.

A general of the vanquished Siamese forces, one



Phra Coah Tak Sin, raised an army of volunteers and succeeded in ousting the Burmese. Phra established a new capital at Thonburi on the west bank of the Chao Phraya. General Phra did not found a dynasty and on his death the succession passed to one of his generals who founded the present dynasty in 1782 and established *his* capital, Krung Thep, at the place known to the outside world as Bangkok, where it remains to this day. Ayudhya was left to wither away.

When my travels took me to Bangkok I found reaching Ayudhya a simple matter. Since I had ample time I decided to go by train. Train travel in Thailand comes pleasantly inexpensive and the roundtrip came to only \$4.00 but consumed the better part of a day whereas the same trip by cab can be accomplished in three hours. The day I picked was Sunday, February 12th. I remember the date well because it happened to be the Sunday of the Chinese New Year. There is a large Chinese population in Bangkok as in all the Far East and on this particular holiday the entire colony seemed headed for Ayudhya.

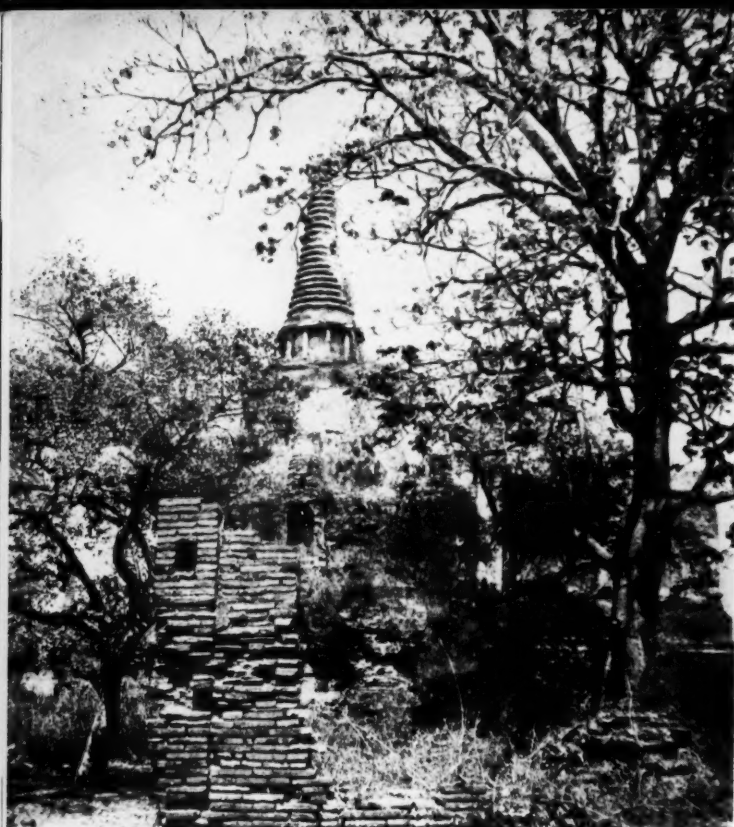
## Photographs by the Author

**Crumbling *chedis***—temple towers—of the ancient capital, Ayudhya. Often in groups of three (see also page 20), old and new, such religious monuments dot the landscape of Thailand.

Like myself they too elected to go by railroad. The trip was an experience I shall not quickly forget. The train was scheduled to leave Bangkok at 8:10 A.M. The wily Chinese had arrived an hour before departure time and preempted every seat in the train, to the chagrin of the Thailanders, who strolled in near train-time to find all the seats occupied. I had purchased a first class ticket for the outward trip and a second class ticket for the return trip. I never learned the distinction between the two classes—not that it mattered. I was herded in with the Chinese who occupied the whole train anyway and who thought it a great joke that anyone should be so gullible as to pay for a first class passage when the same seat could be appropriated on a third class ticket.

The early arrivals now proceeded to have breakfast, which they had brought aboard in tiers of enameled bowls and pans. Men, women and children consumed mountains of rice, together with meat and fish, and spat the bones and fishheads out the windows. Next they rinsed the dishes in cold water, incidentally making a mess of the seats, then dumped the slops out the train windows, to the annoyance of the section hands. Venders contributed to the confusion by passing through the cars peddling pineapple, sugar cane, oranges, and other exotic fruits, as well as soft drinks. As the train pulled into the station at Ayudhya, the platform seethed with the customary furious commercialism that characterizes every Asiatic stopping place. Then began the inevitable dickering with the pedicab boys. My boy began the preliminary bargaining by asking 125 ticals for the circuit of the ruined city; we finally settled for the customary 30 ticals, to the mutual satisfaction of both parties.

A living quarter has grown up on the outskirts of the abandoned city and we passed successively crowded villages and rice paddies where lumbering water buffalo were ploughing the muddy soil. The abandoned city is set in a grassy plain near the bank of the Chao Phraya River. Little remains of the former capital but that little is impressive. It consists of broken towers, cracked temples, crumbling brick walls, colonnades, and the remains of the royal chapel, the latter housing the enormous seated Buddha, the



In two hundred years Ayudhya has yielded to a jungle growth.

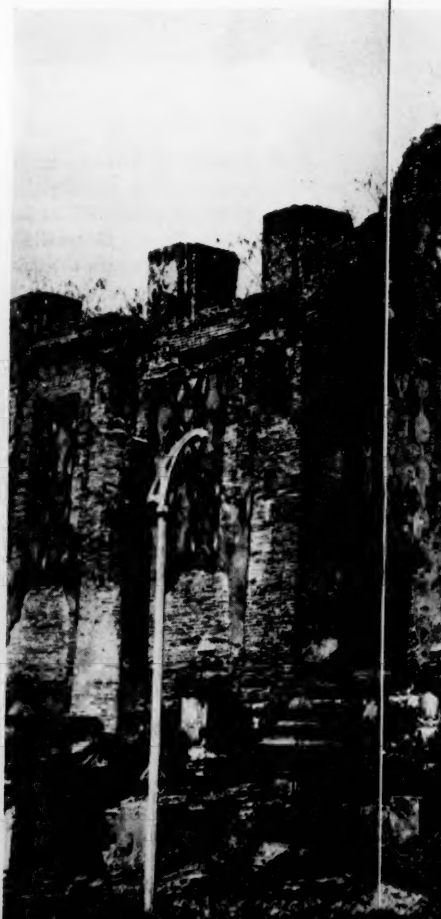
most imposing relic at the ruin site. This Phra Mongkol Bopit (Fountainhead of Grace) is the largest sitting Buddha in Thailand. It is 25 feet across its cross-legged lap and is credited with supernatural powers, making it one of the most venerated idols of Thailand. It was damaged by the conqueror's fire in 1767 and lost its headdress and right arm when the chapel roof fell in. On Sundays and holy days Thai Buddhists come to kneel and pray to the figure. Thus while Ayudhya may be a dead city, the great Buddha remains a continuing symbol of faith and a spiritual inspiration for the living.

The Chinese picnickers paid their respects to the great black and gold Buddha, burned incense and joss sticks and left little floral tributes, after which they retired to the shady spots and devoted the rest of the day to eating. Many squatted on the grassy temple lawn which in the great days of Ayudhya was the site where deceased royalty was cremated on funeral pyres.

My pedicab boy wheeled me about the grounds for a time but I soon wearied of this and parked him in the shade of some trees near the soft drink concession. Handing him a bottle of lemon squash, I strolled about the grounds at my leisure.

The word Ayudhya means "unconquerable," a

Side and end views of the royal palace chapel at Ayudhya.





name which, in the light of subsequent history seems something less than appropriate. The name was bestowed because the city was enclosed by the two rivers, the Menam and the Chao Phraya, and in times of high water was almost completely encircled with water. This situation led to the illusion the city was impregnable hence unconquerable, an attitude of tragic complacency which time was to shatter. What little remains of the former capital covers a rather small area. It does not spread out over miles of countryside as Angkor does in neighboring Cambodia. The present ruins cover only a few acres, although isolated temples and towers are scattered over a much greater area.

Ayudhya was the work of one of the most enlightened Oriental cultures. Not one of the structures at Ayudhya is intact, yet even in ruins all are imposing. The site lacks the classical elegance of Angkor Wat, which is one of the architectural treasures of all time, yet it shows evidence of a high level of artistic perception. All of the ruins show the marks of the fire that razed the royal city. The surviving monuments are for the most part ornate towers rising through rank vegetation. Walls and foundations of reddish brick mark the outlines of massive fortifications, now being inexorably swallowed up by the forest.

udhya.



The Phra Mongol Bopitr is the largest of Thailand's many sitting Buddhas.

Ayudhya is rich in small archeological treasures including bronze and stone artifacts and finely chiseled Siamese heads. The boys and girls of the neighborhood dig up and peddle these art objects to tourists. Unhappily, the purser and stewardesses of the plane that flew me into Bangkok confessed that each time they have a holiday in Bangkok they head for Ayudhya and buy up a quantity of the artifacts which they take back to Europe and sell to collectors and museums at a profit.

The largest standing structure is the chapel of the royal palace. This edifice is damaged on all sides and has no roof. Standing inside but easily seen from the outside is the great black Buddha, so massive it protrudes above what once was the roof. The Buddha originally stood outside in the palace grounds but in 1603 the then reigning monarch had the figure moved indoors. How this feat was accomplished was not clear to my observation, but there it stands, its huge bulk plainly visible through the fissures in the chapel walls. Devotees no longer need enter the chapel to worship at its feet. They can remain outside and pray to it through the vertical cracks in the chapel walls.

The Chinese New Year celebrants decorated the figure with streamers of yellow cotton fabric and

surrounded it with burning incense sticks. These Buddhists did not pursue their devotions with the seriousness which attends devout Christian worship. They alternated between venerating the great towering god and being lighthearted and convivial with equal facility.

Massive Buddhas of this type were formerly cast in bronze or brass but in later years a simpler technique was developed and the figures were constructed of brick overlaid with plaster and finished off with a gleaming surface of gold leaf. This was the method employed in the construction of the Ayudhya Buddha. The original goldleaf overlay, stripped off by the invading Burmese, was replaced from time to time over the centuries. After the towering figure had been struck by lightning on three different occasions, however, the gold leafing was abandoned. Today only scattered vestiges of the yellow metal cling to the giant figure. But even shorn of its glittering covering, the massive Buddha, together with the architectural fragments surviving at Ayudhya, furnish visual evidence that when the Burmese conquerors sacked this ancient Siamese capital for the last time, Indochina lost a showplace which exceeded in splendor anything to be seen in Thailand today.



## Pingers' Progress OR: BIRDING ON A BAMBOO RAFT

WE HAD BEEN BOUNCING for hours over rough roads through a red, dusty, almost desert shrub forest under a glaring, burnished, tropical sun, and now we were threading our way down a steep hill to the broad flat floodplain of the Mae Ping River. There were twenty of us in the dust-laden bus—ten geologists, one geographer, and two ornithologists, explorers from the halls of the Ninth Pacific Science Congress at Bangkok, five hundred miles away. The others were our Thai hosts and hostesses, who had come along to manage this week-long "geology" trip.

### H. Elliott McClure

We pressed hub deep through the sand of the dry floodplain forest, frightening red-wattled lapwings and jungle fowl from the shrubbery. Soon stilted bamboo huts appeared before us and a quick turn brought us to the final terrace above the river.

Beached beneath us were the five rafts that were to take us down the Ping for the next five days. I don't know what I had expected—for the trip had been advertised as a "geology trip down the Ping River on rafts," but I was amazed by small houseboats, about 30 feet long by 10 wide, built of fresh cut bamboo logs, a double tier tied together with bamboo and straw. The mid-section of each carried a bamboo cabin sheathed with the dried leaves of teak, large enough for four people to sleep in and house their gear. A small portico at the side of each was the latrine. The travel was going to be deluxe. Each raft had two native polemen who marveled at all of these foreigners, but who were most amazed at the continuous excitement of the bird men. In the spirit of the thing, our polemen were soon pointing out birds and struggling to inform us, but were frustrated because we didn't speak "the human language." There were new air mattresses and blankets for each member, an abundance of insect repellent, soft drinks (but no ice), and a cook raft loaded with cages of chickens, bags of rice, lockers of meat, vegetables, fruit, etc., including four hundred eggs.

Our Thai host and leader, Nai Jumchet of the Royal Bureau of Mines, assigned us our rafts and we quickly boarded and shoved off. Many villagers gathered to watch the expedition, well-labeled with a large blue and white banner on each raft emblazoned with PSC (Pacific Science Congress). It was nearly sundown when we had arrived, so we could float only a short time this December 2 of 1957 before we would have to beach for the night.

Dr. Boonsong Lekagul and I were strictly outlanders with the group. We had elected to come because

the projected plans which had been circulated at the Congress meetings looked the most promising of all the post-Congress field trips for bird observations and romance. We were not disappointed. The next five days were a lifetime experience—the kind you read about and wish you, too, could have.

On this first day Dr. Boonsong and I had become so elated by the colorful treetop species of birds we saw at Doi Suthep Temple near Chiangmai that we had completely lost track of time and the entire group of geologists waited "en wrath" for us. Somebody brought along a typewriter and each day "The Pinger's Daily News" appeared, the first issue of which had this to say about bird people:

#### THE PINGER'S DAILY NEWS

Vol. 1

December 2nd, 1957

##### Sammy's recommendation

What you should take with you in the here necessities is for yourself!!

You'll want warm clothing like sweaters (the Marilyn or Mansfield kind, please, but you wouldn't dare any way would you?) warm undershirt and etc. would be convenient because it's going to be quite cool in the dead of the night and early in the morning. But after ten o'clock every body is obliged to take off their clothing (my, my) and put on the glaciating ingredients — best and cheapest is the river water itself.

Yes Sir, you'll have to bring up your own preferred sun tan lotion. We'll provide the insect repellents.

etc. etc.

##### Bird watchers (chasers)

Don't get me wrong! I never told you this is a pure geologic trip. I like birds too and I spend many hours (in my whole life) watching birds but never with binocular. Birds are just like beautiful ladies, they love to be watched and chased around and around. Sometimes you forgot all your important social engagements, sometime you leave your dinner cold and sometimes you let your friends waiting for you.

But be careful, if it gets too long, you'll be left behind!!

In the hour or so that we were adrift, before we camped on a large sandbar, we saw or heard only seventeen species of birds. Among these were some of my friends from Japan: snowy plover (*Charadrius alexandrinus*), little ringed plover (*Charadrius dubius*), Greenshank (*Tringa nebularia*), common sandpiper (*Actitis hypoleucos*), plumed egret (*Egretta intermedia*), pied wagtail (*Motacilla alba*), common kingfisher (*Alcedo atthis*). A flock of chattering blossom-headed parakeets (*Psittacula cyanocephala*) had streaked across the river behind us. For those of us who knew parrots only as caged birds, their wild speed was amazing. They dashed among or above the tree tops, calling as if to speed up stragglers, with the





Miss Somphon was queen of the cook shack.

complete abandon of a Paris or Tokyo taxi driver. As dusk set in, the river glowed a copper reflection of the sky. Small night-jars swept in ever changing silhouette patterns back and forth a few inches above the water, catching the innumerable hovering midges.

This first evening was a bit hectic as people learned their jobs and the expedition settled down. Supper was delayed until Miss Somphon (graduate in economics of University of Thailand, University of Michigan, University of New Mexico, and salesman of air conditioners) took over and thereafter became queen of the cook shack. So well did she feed us and care for our special dietetic needs that Dr. Boonsong had no calls for medicine and dispensed only the daily anti-malaria pills.

Poets sing of tropical moonlit nights, and we had six of them, for the moon came full on December 5. Each night was cool enough for a light sweater or jacket and biting insects were almost nonexistent. We slept, some in the cabins on the rafts, some in tents on the beach, some on the sand under the stars, but none was bothered by mosquitoes, black flies, or chiggers. We did not need the repellent.

Our real birding began on Tuesday, for during the day we saw fifty-four species and nearly a thousand individuals. Down a broad valley, still more or less in civilization, we meandered with the wide, lazy river. Extensive sand bars guarded the banks with their numerous villages crowded among lac-producing

dark green trees; behind this screen lay floodplain forest or small cultivated fields.

Combine the kingbird's activity with the slender lustrous green of a parakeet and you have an inkling of the grace and beauty of the bayheaded bee-eater (*Merops leschenaulti*), so common in Thailand, especially along the rivers. We were almost never out of sight of at least one during the entire trip. Because their shiny feathers reflected light, they disappeared against the green foliage the instant they alighted on a twig, and their actions were so swift and dart-like they seemed almost ephemeral. No small bird, however, it is somewhat larger and longer than a swallow.

The large-billed or jungle crow (*Corvus macro-rhynchos*) was at each village and we could tell when we were nearing one, not by any change in the land except the "lac-trees"—if they had been lacking before—but by the sentinel crow announcing our approach. Also in country opened about villages was the spotted-necked dove (*Streptopelia chinensis*) a bird I had met years before in the trees of Bakersfield and Los Angeles.

The sand bar fauna was most abundant this day, and we saw birds on them which did not appear again until we reached another wide valley above the Yan-heel Dam Site on Saturday. These sand dwellers included the snowy plover, river tern (*Sterna aurantia*), little-ringed plover, greenshank, plumed egret, pied wagtail, common sandpiper, marsh sandpiper (*Tringa*



*glareola*), little egret (*Egretta garzetta*), Temminck's stint (*Erolia temminckii*), pond heron (*Ardeola bacchus*), grey wagtail (*Motacilla cinerea*), and cattle egret (*Bubulcus ibis*). The spur-winged lapwings (*Hoplopterus ducaulii*) were the largest and most conspicuous river inhabitants; their clanging call rang out as they swept up on black and white wings to fly on to the next bar. This continued until we had reached the limits of the territory of each small flock, usually five to twenty birds, and then they would turn back. The red-wattled lapwing (*Lobivanellus indicus*), another striking species, prefers the wooded floodplain, but was also present with the spur-wings on this day. And finally, on one bar were all three species, spur-winged, red-wattled, and the grey-headed lapwing (*Microsarcops cinereus*) which reaches its northernmost distribution at Tokyo where I made its acquaintance in rice fields several years ago.

High spots of our ornithological day came first in the morning when a flock of thirteen black and white hawks of medium size came through the trees, crossed our wake, and disappeared into the opposite forest. We had *Birds of Burma* by Smythies and Deignan's *Birds of Northern Thailand* with us and began a frantic search for a hawk that was gregarious. A few moments later our decision was verified, for we intercepted the same flock again; these were black-crested bazas (*Aviceda leuphotes*).

In the afternoon we were half dozing, for birding was dull in the heat of the day, when we passed an island on which the birds were too indolent to be disturbed by our bizarre appearance, and among the lapwings stood a peculiar looking shorebird of equivalent size, but with outlandish elephantine legs and bill. Something clicked in my memory—a picture, a description, a name—and I called out, "Boonsong, could it be a thicknee?" Again we thumbed pages and it was listed as the great-billed thicknee (*Esacus magnirostris*), not a rare bird at all, for it is common in Australia and Malaysia, but a lifetime first for both Boonsong and myself.

Evening found us drawn up single file along an immense beach before the village of Ban Gneaw. It was our second night out and things were running smoothly. We were all standing before the makeshift table dipping up our supper of curry and rice, or were lounging on the sand eating. Villagers had gathered in a semi-circle behind us to watch and darkness had just fallen. Being ultra modern, the expedition was provided with a gasoline driven generator to make light for the rafts and tents (also attractive to insects). As the rafts had been lined up, the cook shack was down stream with the others above. On the farthermost raft a cook's helper was pouring gasoline from a five-gallon can into a small container, ignorant of the fact that the river was carrying drip toward the cook

Some of the five Congress rafts floating quietly down the Ping River. (See map, page 14.)



shack where there were open fires in the cooking hibachis.

We were all brought to our feet as flame streaked up the river and the can burst in a great roar of fire, enveloping man and paper-dry raft. He threw the can and fell into the water where flames spread in a great pyramid and raced toward the opposite bank and tinder dry forest. Everyone threw sand upon the burning rafts and the flames were quickly extinguished with no damage to rafts or equipment, and only singed eyebrows and hair on the cook's helper. The gasoline burned out before it reached the forest, and villagers came down hoping that this was an advertisement for a movie which we might have brought along and which they had never seen.

Later Boonsong and I visited the village and he chatted with young men seated on wooden benches along the main street enjoying relaxation in the moonlight streaming through graceful quiet coconut palms. Their subject of conversation, the doctor said, was that of men throughout the world—women. At a nearby shop the keeper offered us cigarettes of home-grown tobacco wrapped in banana leaves (surprisingly mild) and held a candlelight to my face for the benefit of the youngsters who had never beheld a red-haired sunburned Caucasian "albino-people" as translated by Boonsong).

Wednesday the valley narrowed, villages were left behind, the mountains pressed in upon the river, which had to hasten its pace to continue its work of carving the canyon. Sandbars were also left behind and with them many of the birds we had enjoyed the day before. By the end of the day we had a total of only 44 species and 449 individuals. The kingfishers are the glory of rivers in this part of the world and there had been five species with us all day Tuesday: common, a tiny jewel of iridescent greens and blues, with a ruddy breast, smaller than a sparrow and almost hummingbird-like in its pursuit of a mate; pied (*Ceryle rudis*), as large as our belted kingfisher, garbed in contrasting black and white; white-breasted (*Halcyon smyrnensis*), chocolate colored with a blue back and tail, and a contrasting white breast; stork-billed (*Ramphalcyon capensis*), blue and gold with a brownish head and a very heavy coral beak; and black-capped (*Halcyon pileata*), a deep indigo blue-back with light underparts and jet-black cap passing down over the eyes and nape, with a blood-red bill. The pied and black-capped kingfishers appeared to prefer the broader river and open valleys, but the other three were with us all the way, especially the white-breasted.

The bird thrills of the day included sighting ten of the gorgeous green and gold, flicker-sized, four-toed golden-backed woodpeckers (*Chrysocolaptes lucidus*) hitching up tree trunks along the river. They are gregarious and move in small flocks. We were first attracted to them by the peculiar unidentifiable call that

they gave. We also made reacquaintance with old friends, the anhinga (*Anhinga rufa*) and the tiny red-legged falconet (*Microhierax caerulescens*). This sparrow-sized falcon hawks insects from the air like a kingbird, but swoops on its prey with all of the zest and savageness of a peregrine falcon.

During the day our New Zealand and British ("stone age people" as dubbed by Boonsong) geologists decided that a barbecued pig would be tasty, so one was bartered and butchered along the way. Came evening. Our geologist friends assured us that they knew this type of outdoor cookery. So they dug a pit in the sand and soon had a roaring fire going in it. The pig was cut into chunks and wrapped in banana leaves. Then, instead of letting the fire burn down and burying the meat in a hot bed of coals, they put the meat in the coals and kept the fire going. Result, cremated pig.

Thursday we continued through the canyon. We were in a mountain formation unique to my experience. It was not so massive and impressive as canyons of our West for the mountains in their rich browns and contrasting greens reminded us of the Adirondacks in fall. Rather it was the bizarre nature of the cliffs and rock formations that struck us. This was an ancient limestone uplift in a monsoon climate where the weather is dry for six months, followed by six months of torrential rains, and the mountains were actually dissolving. This rainwater seeping through the mantle of vegetation absorbs its load of organic carbides and becomes dilute carbonic acid which penetrates the cracks and crevices of folded strata and melts its way into the heart of the limestone. The mountains were obviously great Swiss cheeses with caves at all levels and in all directions. Every cliff face had cave openings evident and the cliffs themselves were covered with flowstone and great stalactites hung from them like frozen Spanish moss. It was a speleologist's paradise.

All day long we saw evidence of elephants. Tracks followed the river on both sides and often crossed it, bamboo had been stripped where the pachyderms had fed, and sign was everywhere. We peered hopefully around each bend straining to sight them before they heard us and could slip into the dense bamboo that bordered the river. In the late afternoon we intercepted a band of langur monkeys that had come to the river to drink, but we surprised no elephants.

December 5, the birthday of the King of Thailand, was an occasion which demanded a celebration. We beached on a sandy shore crisscrossed by elephant tracks, and made camp. Miss Somphon had outdone herself, and during the day singing and laughter from the cook raft gave evidence of much activity. We had special curry this night, with a dessert of boiled whole pumpkin filled with tapioca pudding. Another delicacy was served which bears description. Short lengths of

A fisherman and his family in their leanto hut beside the Ping River. (Author's photos)



bamboo (12-18 inches) were cut and filled with uncooked rice soaked in coconut milk. The end of the bamboo was plugged with plant fiber and the stalks were then leaned against a pole supported by forked sticks over a small fire. The bamboo receptacles were occasionally rotated for even cooking and within half an hour the rice had cooked thoroughly. To test the degree of "doneness" a stalk was removed and the wood peeled off by a knife, exposing the delicious nut-flavored rice.

Following our banquet the crew from the cook shack chanted Siamese songs to the accompaniment of clapping and beating on pans while Somphon demonstrated Thai folk dances and we all joined in to dance on the sand 'neath the tropical moon, so that our yells and laughter disturbed the quiet sighing of the Ping River and the silent elephant trails.

#### THE PINGER'S DAILY NEWS

Vol. V.

Dec. 9, 1957

Owing to the King's birthday yesterday we are behind with the news. The important events of the past 48 hours since our last issue have been connected with the King's Birthday Celebration.

**Pig Cremation.** A pig was sacrificed & cremated on the night before the King's birthday. This is an ancient custom of the Polynesian people in the South Sea Islands and is guaranteed to ensure a successful celebration. All who inspected the remains in the morning will agree that the cremation was most efficiently conducted.

**Banquet.** After secretive preparations extending over several hours, a banquet was produced by the cooks in the evening that exceeded all previous perform-

ances. For the benefit of those who have hazy memories we give the menu below.

*Aperitif.* Mekhong & nuts.

*Hors d'Oeuvres.* Mirror Pork Burnt Chili Sauce & Dried Salt Beef.

*Dinner.* Meat Balls, Chap Chai and Rice.

*Dessert.* Pumpkin Custard & Caramel Sauce.

*Apres.* Bamboo Rice & Mekhong.

**Song and Dance.** After the banquet we were entertained by Jumchet & his Somphany orchestra with a programme of old Thai songs & dances. Later there was free for all dancing. Sagnuan, Sarong Man No. 1 & Bird Man No. 1 got off to a good start followed by Sarong Man No. 2 the two Malayan & the Siamese twins. Pumvarn Somphon & Jumchet showed us the steps & we thank them and the cooks for a memorable evening.

**Progress of Journey.** Yesterday we made 18 miles from Wat Wok to Mae Tuen, passing through many rapids, a deserted village (800 years old) and many cliffs limestone draped with stalactites to which names such as Cat Cliff and the Elephant's Trumpet had been given. We expect to be at Yanhee Dam tomorrow p. m.

Reported by Sarong No. 2

Friday, the sixth, found us still between stalactite covered cliffs on the swiftening river. Before the day was over we had "shot" several rapids. In the deep blue canyon shadows we began the day to the clarion call of gibbons and disturbed more monkeys in search of their breakfast. A few moments after we had left camp we rounded a bend and on the beach was a group of men and boys skinning something before a fire. We pulled up to see what they had captured. It

was a great soft-shelled river turtle with a carapace more than a yard in diameter. Boonsong bartered with the fishermen and came away with the carapace, plastron, and skull for his museum. The fishermen had families with them who were living in a leanto of bamboo.

Not much farther on we found the elephants; yes, they were work elephants. Thousands of teak logs had been stranded on beach and bar when the river floods receded at the end of the monsoon, and small elephants with their mahouts were pushing and pulling them back into the river toward the sawmills many miles below. Another item of biological interest during the day was the 15-foot skin of a python stretched to dry at one of the teak worker's camps.

Every birdman in thumbing through the books finds himself longing to see certain species in their native haunts. He conjures the experiences that might attend the search for such species. So it was with me. I had watched hornbills in zoos and hoped for the day I could see them in the wild. Early this morning high in the glowing sunshine four great birds in V formation were flying from mountain peak to mountain peak. They looked like black swans with no heads, just a long neck ending bluntly. They were hornbills, possibly the wreathed hornbill (*Aceros undulatus*), but I was disappointed in that they were too high to distinguish even with good binoculars. The "headlessness" was due to the huge bills extended before them. But Saturday evening just moments before our trip was completed we saw one of this species resting quietly in a tree by the river.

Two other exquisite birds were seen during the day, a white-capped redstart (*Phoenicurus leucocephalus*) and a blue whistling thrush (*Myophonus caeruleus*). Both are species of thrush, the first a small glossy black bird with crown and nape a shining white, and rump, upper tail, belly, and flanks a rich maroon; the second, a robin-sized thrush almost entirely steel blue that gleamed in the sunlight. Both are solitary species, seen feeding along the water's edge on boulders or rocky shores.

Probably the most characteristic sound of the whole trip, even more so than the cooing of doves or tolling of barbets, was the ringing raucous laughter of the laughing thrush. Not a thrush at all, but a member of the tropical family Timaliidae, it is almost jay-like. It was the white-crested laughing thrush (*Garrulax leucolophus*) that guarded these hills. Troops of them fed amid the foliage or on the ground, or hopped from tree to tree on stiff rounded wings. They were the sentinels of the forest, raising an ear-splitting uproar at any intrusion.

This evening, our last away from civilization, was a quiet one, and we gathered around the campfire to talk and listen. The night was beautiful, the mood conducive to reverie.

After a few short rapids Saturday morning the mountains fell away and we entered the broad valley which is immediately behind the Yanhee Dam. With the valley came villages and cultivated fields; the birds in evidence the first day were again with us, so the tally went up from 37 species the previous day to 53. But even this last day was not without its bird thrills. At noon we selected a broad beach for our picnic and I tramped back into the floodplain forest. White-crested laughing thrushes were conspicuously ignoring me to center their uproar on a dense clump of bamboo. From it I flushed a brown fish owl (*Ketupa zeylonensis*), large and cumbersome in daylight flight as a great horned owl. In his escape he disturbed a band of ten glorious black-naped green woodpeckers (*Picus canus*) which had been unseen and which seemed to explode from their tree trunks.

The addition of the red-breasted parakeet to our list brought to four the number of parrots we had seen: blossom-headed, rose-ringed (*Psittacula eupatria*), slate-headed (*P. himalayana*), and red-breasted (*P. alexandri*)—all lovely birds, and all so fast of flight that observing them meant, "There-they-go!"

Toward mid-afternoon the mountains began to close in upon us again and we were in a narrow channel between two uplifts when we reached the Yanhee Dam Site. This dam will be 600 feet high and will back water to form a lake extending the entire distance that we had covered in five days, about 180 kilometers. All of the cliffs, valleys, and forest that we had seen along the river will be buried beneath hundreds of feet of water. Not only will the lake be very beautiful, penetrating thousands of little valleys, but the very mountains themselves will be saturated, since all of the lower caves will be flooded. At present Thailand has no national parks and it is hoped that this beautiful unique area will be set aside so that commercial interests cannot enter and the lake will furnish not only power and irrigation water, but recreation as well. Of course, it will fluctuate tremendously from season to season, but possibly still will be a place of beauty and pleasure. I hope again some day in years to come to go boating where laughing thrushes call and soft evenings are punctuated by the barred owl.

Saturday evening we camped once more on the river bank, for rest houses at the Dam Site had not been completed. We were served an excellent dinner (more curry and rice) by the engineers and officials of the construction company. Early Sunday morning we took a short trip into the spillway construction, and then loaded our impedimenta onto a bus for the 400-mile trip back to Bangkok. As we drove out of sight of the river, a flock of hoopoe (*Upupa epops*) flushed from the roadside, another life first for me, bringing the total of the Ping River list for one week to 95 species and 3,200 individuals—not a bad score for a geological field trip.



## FOCUS ON NATURE WITH ARTHUR C. SMITH

### Pythons & Kingfishers

**M**Y OWN personal knowledge of Thailand and its natural history has been quite limited in the past but I find that I now have a special incentive for learning more. I have just received word that my twin brother, Edgar, reports for duty on a new ICA assignment in Bangkok on September 1.

Some months ago I did become acquainted with a local television "star" from Thailand, however. Stopping in at Steinhart Aquarium to see Earl Herald, I found that I had arrived just in time to help five others carry this temperamental star downstairs for its once every three weeks feeding. As you may have guessed by now, I am referring to that well-known Thai, the Reticulated Python (*Python reticulatus*), whose appearances on "Science in Action" have always aroused considerable interest and even excitement.

This particular specimen, captured near Bangkok about three years ago, is 21 feet long. This certainly seems long but is far short of the 32 feet chalked up by this apparent world-recordholding species. The Reticulated Python of Asia is considered the longest snake in the world with the Anaconda of South America a close second at 30 feet. Third, fourth, and fifth places go to the Rock Python of Africa (25 feet), the Amethystine Python of Australia (21 feet), and the Boa Constrictor of Mexico and Central America (18½ feet) in that order. Maximum length figures for snakes are notoriously unreliable, especially if taken from skins which stretch a great deal. The figures quoted are the "probable greatest measurements" as given by Clifford H. Pope in *The Reptile World* (Alfred A. Knopf, New York, 1955).

Many snakes must be force-fed in captivity. Although a 12-foot python at Steinhart Aquarium started to eat voluntarily recently after some years of regular force-feeding, the giant python is force-fed every three weeks. When we got the big snake down to the basement five of us held it on a table while Dr. Herald carefully pushed a number of rats and pigeons down the snake's throat. Holding this mass of writhing muscle down was not as easy as it sounds, even for five men. Whenever it gave a convulsive flip-flop it would lift the man in that sector right off his feet. When it was able to slide even a little bit of its body over the edge of the table it could apply tremendous pressure and it was all we could do to straighten it out and keep it from slipping off the table. If it had managed to throw a coil around a table leg I rather think the Aquarium's table would have had a broken leg before we got the snake uncoiled again.

During the feeding period I also collected a number of ticks from under the python's scales. These were later identified by Deane Furman of the University of California entomology department as *Amblyomma helvolum* Koch.

Many other aspects of Thailand's natural history are equally interesting. More than 1,000 kinds of birds are found within the country's boundaries. Although we have but one kingfisher in the United States, Thailand has many. These colorful and unusual-looking birds form an important and characteristic part of the Thailand avifauna.

The 21-foot python from Bangkok in the TV studio for "Science in Action."  
(CAS photo by Elmer Moss)





Conducted by George W. Bunton & O. Richard Norton

## ASTRONOMY

**E**VERY GREAT NATION of the world has in its history men of heroic stature who are credited, usually deservedly, with bringing honor to their nation. In some cases it has come about through military leadership in war or rebellion. In others it is through political maneuvering or through economic reforms. In a few cases, men are revered because of their general wisdom. Sometimes men are remembered simply because they are kings.

Thailand owes its present place among free and honorable nations in large measure to the wisdom and progressiveness of two of her kings—father and son—who reigned for over a half century, but perhaps the most important half century in the history of Thailand. It began in 1851 at a time when small nations were being swallowed by the expanding empires of the West.

Both these kings were intimate acquaintances of an English woman, Anna Leonowens, the "Anna" of *Anna and the King of Siam*. Because of her associa-

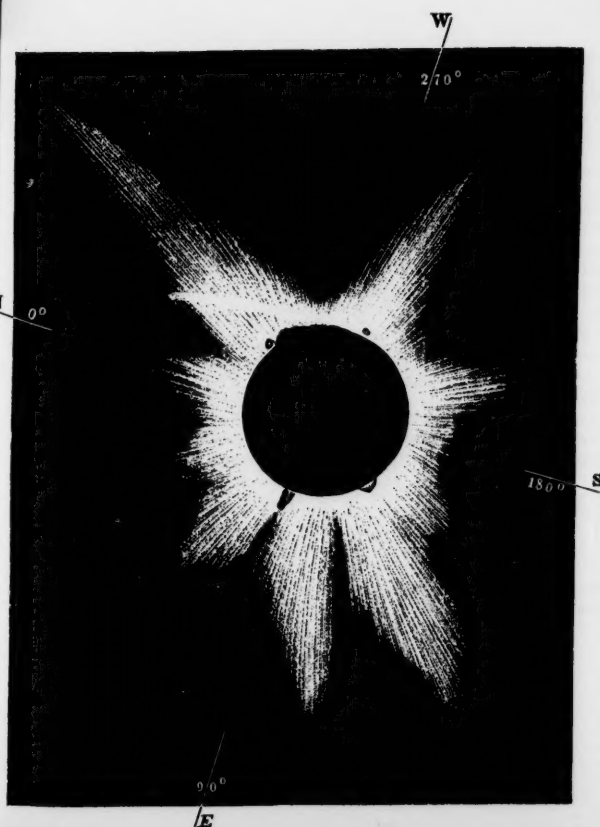
tion with the king and his son, we of the West have a detailed description of an exotic and mysterious country, its royalty and its way of life that would otherwise have been lost.

The king who employed Mrs. Leonowens to tutor his children (and no small job was this, as the children of the king numbered sufficiently to fill a school-house), was known to his subjects as Phrabat Somdetch Phra Paramendr Maha Mongkut Phra Chau Klau Chau Yu Hud. To westerners he is known as King Maha Mongkut. His son, one of Anna's brightest pupils, is known as King Chulalongkorn. These two men, through their promotion of freedom, education, and international treaties, assured Siam an honorable place among nations.

The reason this discussion finds place in the Astronomy Department of this magazine is that King Mongkut was himself interested in the sciences, and mathematics and astronomy in particular. A total eclipse of the sun was due to describe a path across Siam on

# DEMONS and Kings

King Maha Mongkut and his queen. (From *Siam—Land of the White Elephant*, by George B. Bacon. Charles Scribner's Sons, New York, 1881)



August 18 of 1868. The king took great interest in this event and himself computed the time and locale of the eclipse with what Mrs. Leonowens describes as "respectable accuracy."

A royal expedition of remarkable magnitude resulted in the erection of an observatory at a site called Ha Wann ("The Whale's Head") on the east coast of Siam, and in addition . . . "numerous pavilions varying in size and magnificence, for His Majesty and retinue, the French commission, the Governor of Singapore (Colonel Ord) and suite, who had been invited to Bangkok by the King, and for ministers and nobles of Siam," Mrs. Leonowens continues.

"Provision was made, at the cost of government, for the regal entertainment, in a town of booths and tabernacles, of the vast concourse of natives and Europeans who followed his Majesty from the capital to witness the sublime phenomenon; and a herd of fifty noble elephants were brought from the ancient city of Ayudia for service and display."

The eclipsed sun showing the coronal streamers and the prominences lying close to the surface. Drawing probably produced from visual observation of the 1868 eclipse in India. (From *Contributions to Solar Physics*, by J. Norman Lockyer, Macmillan & Co., London, 1874)

Mrs. Leonowens estimates that not less than a hundred thousand dollars was expended upon this expedition, which contributed to the death of the king soon afterward.

At the beginning the eclipse was obscured by clouds, but when soon the sky cleared, it was perceived that the eclipse was in progress, with about one-twentieth of the sun's disc covered. The king, a man of education and science, bowed to tradition, . . . "announced the fact to his own people by firing a cannon; and immediately pipes screamed and trumpets blared in the royal pavilion—a tribute of reverence to the traditional fable about the Angel Rahoo swallowing the sun. Both the king and prime minister, scorning the restraints of dignity, were fairly boisterous in their demonstrations of triumph and delight, the latter skipping from point to point to squint through his long telescope. At the instant of absolute totality, when the very last ray of the sun had become extinct, his Excellency shouted, 'Hurrah, hurrah, hurrah!' and scientifically disgraced himself. Leaving his spyglass swinging, he ran through the gateway of his pavilion, and called to his prostrate wives, 'Henceforth will you not believe the foreigners?'

"But that other Excellency, Chow Phya Bhudharahay, Minister for Northern Siam, more orthodox, sat in dumfounded faith, and gaped at the awful deglutition of the Angel Rahoo."

The rigors of the expedition and the fever of malaria, very likely contracted from his jungle sojourn, brought about the death of King Maha Mongkut on October 1, less than a month after his scientific triumph at the eclipse.

This eclipse of the sun proved to be one of the most important in the history of astronomy, for this was the first time the spectroscope had been applied to the study of the outer parts of the sun. Observers had noted the pale and pearly white light of the corona and the bright red jewel-like "prominences" sparkling around the edge of the eclipsed sun, but no one had been able to determine the makeup of the red light of the prominences. The prominences had only a few years earlier been identified as being a part of the sun.

In India, M. Janssen, of the French Bureau Des Longitudes, determined the content of the prominences to be mainly hydrogen gas, but he and J. Norman Lockyer observed a mysterious bright yellow line in the spectrum of the prominences which neither could identify. Lockyer reports: "Besides these two lines, which settled the question as to hydrogen, another line was observed near D (D is the designation of a line in the solar spectrum arising from sodium), which, strangely enough, had no dark line in the solar spectrum corresponding with it."<sup>\*</sup>

The identity of this line was not determined until the eclipse of 1874, when it was found to be due to a gas thus far unknown on the earth, and because of its presence on the sun, it was called *helium*, after *helios*, Greek sun.

C.W.B.

<sup>\*</sup> J. Norman Lockyer, *Contributions to Solar Physics*, Macmillan, 1874, p. 125.

## References:

- The English Governess at the Siamese Court*, Anna H. Leonowens, 1870.  
*Siam—The Land of the White Elephant*, George B. Bacon, 1900.  
*Contributions to Solar Physics*, J. Norman Lockyer, 1874.  
*Introduction to Astronomy*, Cecilia Payne-Gaposchkin, 1954.

## SKY DIARY

September, October, November 1960  
 (All Times are PACIFIC STANDARD TIME unless

### Phases of the Moon

☾ Full Moon	September 5	4:19 A.M. PDT
☾ Last Quarter	12	3:20 P.M. PDT
☾ New Moon	20	4:13 P.M. PDT
☾ First Quarter	27	5:13 P.M.
☾ Full Moon	October 4	2:17 P.M.
☾ Last Quarter	12	9:26 A.M.
☾ New Moon	20	4:03 A.M.
☾ First Quarter	27	11:34 A.M.
☾ Full Moon	November 3	3:58 A.M.
☾ Last Quarter	11	5:48 A.M.
☾ New Moon	18	3:47 P.M.
☾ First Quarter	25	7:42 A.M.

### The Planets

**Mercury:** During September Mercury is too close to the sun for observation. It reaches greatest eastern elongation on October 15. Although this is an unfavorable elongation the planet may be seen for a few evenings low in the southwestern sky just after sunset. On November 24 Mercury is at greatest western elongation and for a few mornings may be seen in the southeastern sky before sunrise. On November 7 Mercury transits the sun. This is the second of a pair, the last transit having occurred May 5-6, 1957. Mercury's transits occur in pairs about three years apart at intervals of about ten years. This transit will have already begun by sunrise and will be over at 11:12 A.M.

**Venus:** During these months appears as an evening star low in the west just after sunset in September, remaining visible as long as two hours after sunset by the end of November. On the evening of November 18 Venus and Jupiter are close together; on the evening of the 27th Venus is close to Saturn.

**Mars:** Moves from Taurus to Gemini in September. During this period Mars rises in late evening and is prominent throughout the night. The magnitude changes from +0.5 to -0.5 during this time. On November 21 Mars is stationary and then begins to retrograde, or move westward among the stars.

**Jupiter:** In Ophiuchus in September, in Sagittarius during October and November. Magnitude varies from -1.8 to -1.5. The planet sets before midnight at the beginning of the period, about two hours after sunset at the end (see *Venus*).

**Saturn:** At +0.7, is in Sagittarius, east of Jupiter, throughout this period. Sets before midnight in September, about three hours after sunset by November. On September 15 Saturn is stationary and then resumes direct, or eastward, motion among the stars.

**Special Events:** During September there will be two eclipses. On September 5 there will be a total eclipse of the moon. Its beginning will be visible in North America except the extreme North-east; the end will be visible on the West Coast.

Moon enters umbra	2:36 A.M. PDT
Totality begins	3:38 A.M. PDT
Totality ends	5:06 A.M. PDT
Moon leaves umbra	6:08 A.M. PDT

On September 20 there will occur the second partial eclipse of the sun for this year. While the partial eclipse of March was visible in Australia and Antarctica, the one in September will be visible in all of North America except the very eastern strip where it will begin after sunset. In the eastern half it will still be in progress at sunset but will be completed before sunset in the western half. The approximate times are:

Beginning of eclipse	4:00 P.M. PDT
Middle of eclipse	4:50 P.M. PDT
End of eclipse	5:40 P.M. PDT

For the region of San Francisco about one-third of the sun's diameter will be covered. M.R.A.



## REVIEWS

### The long, cold front

**West of the Indus.** By William O. Douglas. Doubleday & Company, Inc., Garden City, New York. 1958. xiii + 513 pp., endpaper maps. \$5.00.

On the ferry crossing the Bosphorus from the Asiatic part of Istanbul to the European, Justice William O. Douglas found himself reflecting, at the end of a seven thousand-mile drive from Karachi, West Pakistan, that "Asia with its mysticism, subtlety, indirection, and of course poverty, was somehow a home to which I would always have to return." Two earlier Asian books of his have been reviewed in these pages: *Beyond the High Himalayas* (1952) and *North from Malaya* (1953). Now with *West of the Indus* Justice Douglas has greatly extended the record of his travels and observations along the huge southward arc of small nations fronting the vast Asian land mass which belongs largely to two of the biggest nations—the Soviet Union and China. The first book dealt with the arc's midpoint, the Hindu Kush, from Kabul to the Karakoram, where the USSR, Afghanistan, Pakistan, India, and China interlock boundaries like parts of a jigsaw puzzle. The second is subtitled "Adventure on Five Fronts"; its parts are "Malayan Jungle Guerrillas," "The Huks of the Philippines," "Vietnam—a Nation in Disintegration," "Burma and the Counterrevolution," and "Formosa, Korea, and the Fifth Front." The third book logs the arduous auto trip of the Justice, his wife, and their friend Mrs. Mary Watkins, from the valley of the Indus, over Khyber Pass into Afghanistan, skirting the Russian border through Iran to the Caspian shore (with a side trip to Isfahan and Shiraz), down into Iraq, northward toward the Caucasus, and across the Black Sea side of Turkey to the Bosphorus.

Justice Douglas loves travel and places and people. These—the first and last especially—are travel books in the best tradition, and tell of far places and strange peoples with that magic touch of the best such books which dissolves distance, disarms strangeness. The present book is enlivened with incidents of the road involving the personality of Mary Watkins' Chevrolet station wagon, the mechanical talents of Mercedes Douglas, and the abundance of local interest and helpfulness applied to their problems frequently linked with a dearth of local replacements, supplies, and good roads. The author is continually fascinated by the road back—into history—and so we listen to the home-made Pathan rifles that made the Khyber "a name better known in Asia than any other"; or we follow the eastward star of Alexander the Great. But above all this liberal jurist loves people—not just abstractly, as masses, as objects of sociological concern, but concretely and directly, as individuals: William O. Douglas is perhaps America's most influential person-to-person ambassador. As an Associate Justice of the Supreme Court, he is privileged to call upon and chat informally with the Wali of Swat, the Shah of Iran, or the President of Turkey. This summitry-without-portfolio is incalculably productive of good will, for, while the Justice is not a head of state, he is eminently acceptable as a highest-level representative of the American nation and people. And this—we should be proud to recognize—is because he is equally at ease drinking champagne with kings and presidents or drinking water from a jug under a haystack with a humble farmer.

The dedication of *West of the Indus*—"To Ali, the Persian peasant of Hamadan, who offered me his jug of cold water on a blistering hot day"—bespeaks the kind of ambassadorship Mr. Douglas would have every American feel, and, if he can, practice towards other people, in Asia or anywhere. Travel books these are, and equal to any;

they are also a long, hard, close-up look at the longest front of the cold war (including sectors where it is, or was at the time of writing, hot); and they are an eloquent plea to us to share the spirit of genuine friendship with the plain people of Asia which will help win respect for us and create a climate more receptive to democracy than to communism. If we will not, we are doomed to inevitable loneliness in a changing world—a world we won't like.

**Back to Bokhara.** By Fitzroy Maclean. Harper & Brothers, New York. 1959. 156 pp., 32 photos, map. \$3.50.

Sir Fitzroy Maclean, one of Britain's foremost writers "of travel and adventure in strange lands" (*Escape to Adventure, A Person From England*), can, like our Mr. Douglas, command attention and services through channels not open to the common tourist. Like our well traveled jurist, he too likes to break free of officiality, take byways, meet with people at road's end in other worlds. And he feels with Douglas that it is vital to keep open the lines of person-to-person friendship—"the more contacts, the more exchanges of visits, . . . both official and unofficial, the better."

Sir Fitzroy's adventures here are along the north side of that boundary south of which Mr. Douglas traveled in his *Indus*—the romantic region from Turkestan to the Caucasus, with its story-book cities, Tashkent, Samarkand, Bokhara, Tiflis. This is a "twenty years after" return visit to the Soviet Union; he finds marked change in the attitudes of people who enjoy a degree of political and economic status (the eternal peasant of the borderlands changes little from age to age). The new privileged class, the operators of the system, has a stake in a future that only peaceful progress can guarantee. USSR and USA are heading towards a common level of living, he thinks; we can coexist if we of the West hold our ground and nobody panics at the pushbutton. D.G.K.

## EASY CHAIR COMFORT



## LONG RUGGED WEAR

# LEVI'S

AMERICA'S FINEST OVERALL

Since 1850

The San Francisco Collection of New Writing, Art, and Ideas

**CONTACT**Incorporating *Western Review*

Presents a special issue . . .

a unique exploration . . .

into the world of

**THE CRIMINAL MAN**

—Clementi

**SUBSCRIBE NOW**

Name \_\_\_\_\_

Address \_\_\_\_\_

City &amp; State \_\_\_\_\_

To begin with issue (circle one) 1 2 3 4 5 6

1 yr. \$5.00 ☐ 2 yrs. \$9.00 ☐ Cash ☐ Check ☐ Bill me ☐

4 issues per year

Single copies \$1.45

**CONTACT P.O. BOX 755, SAUSALITO, CALIFORNIA****"Kujira"**EDITOR, *Pacific Discovery*:

Clifford V. Harrington's "Kujira" [*PD*, July-August 1960, pp. 2-15] is a wonderfully written article, the work of an accomplished professional journalist. Only a few statements could stand revision or reinterpretation.

The grooves of the belly and chest of the rorqual whales (blue, finback, sei, humpback, and pygmy finner) are permanent lands and grooves, and cannot be flattened out like the pleats of an accordion. Such grooves probably have nothing to do with feeding—the right whales and the gray whales feed in like fashion with similar baleen strainers, but do not have the grooves. Suction of water into the mouth would have to be done at some point behind the mouth, and the water would have to enter the bellows—in this case the throat or stomach—which it does not do. I believe the grooves are a mechanism to cool the body during overheating in fast swimming,—all rorquals are fast except the humpback, which is secondarily slow,—or a mechanism to reduce turbulence of water in such fast swimming, or both.

Before one puts the powder-charged head on the harpoon one puts a special spring-actuated fuse into the head of the harpoon shank to detonate the powder five seconds after discharge—a minor point, but the harpoon head wouldn't explode without it.

A solid-shank harpoon in the whaling stations of California weighed 158 pounds with head. I presume the Japanese still use the split-shank, which should weigh around 125 pounds, though I never weighed one of the latter.

To say that "the cycle of the finback whale from conception through birth and early growth runs about two years" is a little misleading. Gestation is about 12 months, nursing six months, which means that the combined time of dependence of the embryo and newborn on the mother is 1.5 years. The stages should be separated.

The figure of 200,000 finbacks for the world should have applied to the Antarctic only. To understand the figure: 200,000 finbacks means 100,000 males and 100,000 females, of which perhaps 60,000 (of each) are mature; with a single young every other year, 30,000 calves are born annually. The annual toll of finbacks in the Antarctic is about 28,000. With some natural mortality, say 20 per cent, only 24,000 of the annual calf crop would survive. The toll is thus 3,000 more than the annual recruitment—conservation is hardly working. Even figuring 70,000 mature females and 35,000 annual calf crop, a 20 per cent mortality (which is conservative) means recruitment of 28,000—exactly the same as the harvest.

I am inclined to the figure based on 60,000 mature females, and to the conclusion there is little conservation. I think Harrington's biggest mistake is overestimating the effectiveness of international whaling regulations in protecting the whale. Forces of finance, prestige, and political sovereignty are too strong. The blue whale has dropped in the Antarctic catch from 29,410 in the summer of 1930-31, to 1,512 in 1956-57, 1,690 in 1957-58, and 1,191 in 1958-59. Does this sound like conservation, even with the season on blues reduced to about two-thirds that of finbacks? The blue whale needs absolute protection as a species in all southern waters—protection by species, by grounds, or by populations is the only method that will work.

The blue-whale unit—1 blue whale=2 finbacks=2.5 humpbacks=6 seis—is a measure of oil; a quota of blue-whale units to protect whales is a perfect example of self-deception on conservation. The humpback whale once was reduced in the Antarctic to the point where it no longer entered in the catch appreciably, and was given complete protection without opposition. It recovered to the point where now there is a four-day season. The blue will eventually get this protection, but, twilight has already fallen on the titan.

No blue whale out of 3,820 specimens measured, 1924-51, by biologists of the Discovery Committee of England or by the Japanese under SCAP supervision was more than 93.5 feet for females and 87.5 feet for males. Both the English and the Japanese figures tallied almost to a half foot. The 100-foot blue whale remains elusive; 95 feet can be considered the outside maximum.\*

\*The statement as it appears after editing in Harrington's article, "... recorded at over 100 feet and still caught 80 to 90 feet long," was submitted to the Academy's curator of mammals, Dr. Robert T. Orr, who felt there were sufficient grounds to let it stand. A statement that has been allowed to stand uncorrected for 17 years may be found in

## academically speaking

THE ANNOUNCEMENT made by the Board of Trustees in the month of July of the reactivation of the Academy's Department of Invertebrate Zoology is, on the face of it, a simple, direct, and interesting bit of news, indicating a further expansion of Academy activities in a pertinent and important direction.

There is more to the statement than meets the eye, however, and a short review of the diverse and checkered history of this branch of scientific research at the Academy makes an engaging few paragraphs of reading.

The Academy's first constitution, adopted on May 16, 1853, specified: "The officers of this association shall be a President, a First Vice-President, a Second Vice-President, a Treasurer, a Corresponding Secretary, a Recording Secretary, a Librarian, and three or more curators."

The three curators mentioned were elected at the following meeting, May 23, 1853 and apparently were curators-at-large as no departmentalization was indicated. The first mention of departments was in the meeting of January 6, 1855, at which time Dr. W. O. Ayres was elected Curator of Zoology, Dr. W. J. Andrews, Curator of Botany, and Dr. W. P. Gibbons, Curator of Geology and Mineralogy.

By 1875 the number of departments had grown to six: Crustacea, Radiates and Ichthyology; Conchology; Ornithology; Entomology; Paleontology and Mineralogy; and Botany. It is obvious from this that recent invertebrates were scattered among three departments. Subsequent interest in the invertebrates, other than insects and mollusca, seems to have waned, and at the time the Academy

The statement that finbacks live to 40 years made me think back to records of markers recovered. As I remember, about 24 years is the longest a marker has been known to be in a finback. Though some individuals may live to 30 or 40 years, I think the expectancy of life is normally only 20 to 25, and in the face of the intense whaling efforts perhaps only 15. The way Harrington described the Japanese catcher boat relentlessly hunting down five of the six finbacks in one pod, chilled the blood of me as it must have done that of the surviving whale. . . .

There is a remarkable statement that "Whales . . . are believed to locate *Euphausia* by ear. The krill emit a high-pitched sound. From laboratory reconstructions of whale ear mechanisms scientists have figured that whales can tune in the krill frequency." I am unaware that any Euphausiidae make any sound that can be picked up by hydrophones, which would be necessary for man to learn about it. And, an ear mechanism cannot be tuned in and out of frequencies. It is permanently tuned to a certain range.

The statement that the Indian Ocean above the Equator and from 50° to 100° east—especially the Persian Gulf in the southern winter—is the site of "heavy concentrations" of finbacks is news indeed, which must have been gathered by Japanese tuna-fishermen.

In no way detracting from Harrington's article are the general points that photographs sell as many articles as text, and—who shall be our science writers of the future: the photographers, the journalists, or the scientists? You will probably answer: Why, of course, the many photographers and journalists who are scientifically inclined, and the few scientists who can write and have the time—which is the situation that has existed all along. But, I think the heat is on the photographers and journalists, and that they may gradually lose out to the scientists—though Clifford V. Harrington needn't worry. We may even get a new breed of writing scientist to meet the demand for explaining science to the citizen and the legislator. Knowledge is, after all, the final goal, though its purveyance must be interesting, not dull, to reach the general reader.

RAYMOND M. GILMORE

La Jolla, California, 12 July 1960.

*Sailing Directions for Antarctica, Including the Off-lying Islands South of Latitude 60°: H.O. No. 138 (First Edition 1943). U.S. Navy Hydrographic Office, Washington, D.C. It appears under Fauna: "Blue Whale (*Balaenoptera musculus*). Largest whale known. Length from 70 to 150 feet." This is the current edition and a check just made shows no published correction. A typographic error, perhaps?—Ed.*



moved to its new building on Market Street in 1891, only three curators are listed: Dr. H. H. Behr, Entomology; Mr. L. M. Loomis, Ornithology; and Miss Alice Eastwood, Botany.

In 1893, Dr. Gustav Eisen was appointed "Curator of Archaeology, Ethnology and Lower Animals"—a seemingly curious title, but appropriate to the versatility of the appointee. Subsequently, in 1899, his title was changed to "Curator of Marine Invertebrates."

Since destruction of the collections by the earthquake and fire of 1906, some previously existing departments have never been re-established, e.g., Anthropology and Archaeology. In the "Report of the Director of the Museum for the year 1915," the following brief reference is made to a Department of Zoology: "This department was re-established only a year ago, and only a small allotment was made for its use. This fund has been expended in part in starting the making of a synoptical series of the marine invertebrates of the California coast."

In the Annual Report for 1917, the name of Walter K. Fisher appears as Curator of the Department of Invertebrate Zoology, a position he held until his death in 1953. In the later years of his tenure, the position was honorary and the department largely inactive.

In 1938, the Academy's collection of invertebrates was partly in the custody of the Department of Paleontology, partly in the Department of Ichthyology, and partly in the Aquarium. Before the recent reactivation of the Department, the collection had been consolidated, with the exception of the material in the Department of Paleontology (now Geology).

Upon recent examination, it seemed obvious that a Department of Invertebrate Zoology was a "must" since there is no recognized central collection or repository of invertebrates (other than insects) on the Pacific Coast, and such a need clearly exists. These facts, coupled with the knowledge that the Academy has a present collection numbering 5,000 lots and probably 50,000 specimens of invertebrates outside of any other department (an excellent nucleus for such a repository), gave impetus and subsequent approval to the plan. Thus, an idea became fact.

Dr. Robert C. Miller, Director of the Academy, has been given the additional title of Curator of the Department, and Allyn G. Smith, until recently Executive Assistant to the Director as well as Research Malacologist in the Department of Geology, was appointed Associate Curator.

Reactivation of this Department has been enthusiastically endorsed by neighboring colleges and universities which have indicated that a strong Department of Invertebrate Zoology at the Academy will fill an important gap now existing in the natural sciences.

**Happy curators,**  
Robert C. Miller,  
Allyn G. Smith, and  
assorted shells.  
(CAS, M. Giles)

**Please**

**pass**

**the**

**word**

**along...**

Share your enjoyment of *PACIFIC DISCOVERY*  
by giving a subscription to a friend.

Send us the names and addresses of other friends  
and cousins and aunts who would enjoy this kind of  
magazine, and we will happily mail sample copies to  
them—at our expense, of course.

\$3.00 a year

*PACIFIC DISCOVERY*—published bimonthly by the  
CALIFORNIA ACADEMY OF SCIENCES  
Golden Gate Park, San Francisco 18, California



